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FROM its foundation our Society has enjoyed the eminent favour of the patronage and support of the reigning Sovereign, with the honour of displaying the Crown in its device and the privilege of recommending for royal approval the names of two geographers deemed worthy to receive the medals, by the award of which the Sovereign's patronage is yearly exercised. From early manhood His Late Majesty had bestowed upon our Society his signal favour. As Duke of York and then as Prince of Wales He was our Honorary President and Vice Patron, giving distinction to our great public occasions by His gracious presence, and encouragement to our explorers by his sympathetic interest. On his accession to the Throne His Majesty King George the Fifth confirmed to our Society the Royal Patronage which had been accorded by His ancestors, and in the twenty-five years of His beneficent reign gave to us especial marks of His interest and esteem. As most loyal and loving subjects we mourn His passing, in all humble and affectionate regard.

P. Z. COX, *President*

THE MOUNT EVEREST RECONNAISSANCE: *A paper read at the Evening Meeting of the Society on 2 December 1935, by*

ERIC SHIPTON

WHEN last spring the Mount Everest Committee received the permission of the Tibetan Government to launch another attempt on the mountain they were faced with an unusual situation. The permission to operate in Tibet covered a period of a year from June 1935 until June 1936. It was too late in the year for a pre-monsoon attempt on Mount Everest, and yet it was obviously a pity not to utilize all the available time.

There has been a very considerable body of opinion which held that the correct time for an attempt on Mount Everest was during or immediately after the monsoon, and there was much to be said in favour of this view. Probably the most serious and dangerous obstacle climbers have met with on the mountain has been the terrible north-west wind which is such a constant menace before the breaking of the monsoon. When the monsoon winds are established this obstacle is removed and there follow some months of comparatively calm and warm weather. Weather conditions indeed are then ideally suited to prolonged siege tactics such as those employed with such remarkable success by the Bavarian expedition on Kangchenjunga, tactics which would be quite impossible to employ on Mount Everest before the monsoon. But unfortunately the heavy snow which falls on the mountain during the monsoon makes a fresh obstacle about which we had very little data. It was known that the snows which fall in the earlier part of the monsoon would consolidate readily on flat glacier and on the great fluted ice ridges of the Himalaya, but we were by no means certain about the behaviour of the snow lying on extensive faces at altitudes above 23,000 feet. The disastrous avalanche on the North Col in 1922 and the impasse with which the Bavarians on Kangchenjunga were faced as soon as they left their ridge in 1931, were indications that monsoon snow at great altitudes formed at least a temporarily impassable barrier. Whether or not there occurred any time during the warm monsoon period when this snow was in a manageable condition was a question badly in need of an answer.

Therefore the Committee decided to send out a reconnaissance expedition with the following objects in view:

1. To collect data about monsoon snow conditions at high altitudes and investigate the possibility of a monsoon or post-monsoon attempt. This necessitated our remaining in the vicinity of the mountain during the whole period of the monsoon.

2. To examine the possibility of alternative routes from the west. Two had been suggested: the north-west ridge which rises from the head of the Central Rongbuk glacier; and the practically unknown Western Cwm which is really a tributary of the valley which contains the Khumbu Glacier.

3. To report on the present ice formations on the North Col. This would be of use in deciding what apparatus will be necessary for the main expedition next year.

4. To try out new men as possible candidates for the main expedition and to secure for them preliminary acclimatization.

Telephoto from Nyonno Ri range. Lhotse, Mt. Everest N. Col, Changtse (N. Peak); Khinge in foregrou

5. To try out new designs of tents and other equipment; and also new ideas for provisioning high-altitude expeditions. In this latter connection I secured great assistance from Dr. Zilva of the Lister Institute.

6. To carry out a stereo-photogrammetric examination of the northern aspect and valleys of Mount Everest, and to continue the work of the Reconnaissance Expedition of 1921. It is unfortunate that the all-absorbing problem of reaching the summit had relegated science to the background, and that we had still little precise knowledge of the heights and contours of the Northern Face.

This then was a golden opportunity; and the Committee invited Michael Spender to join the expedition. He had only just arrived in England for a short holiday from Copenhagen, where he was engaged in working out the results of his last Greenland expedition. The Danish authorities kindly released him from his contract and he had just three weeks in which to make his plans and to collect his instruments. Now, as on the expedition itself, he displayed an energy and enthusiasm for which I soon came to have a considerable respect. We took with us the Wild photo-theodolite which had been used by Professor Mason in the Karakoram in 1926, and a lighter Zeiss photo-theodolite lent by the Danish Geodetic Institute and adapted to take films.

I budgeted to run the expedition for an inclusive cost of £200 per head. The Committee invited five other mountaineers to join the expedition: H. W. Tilman, who had been my companion in the exploration of the Nanda Devi basin last year; L. V. Bryant of New Zealand, who brought with him a very considerable reputation for toughness and mountaineering skill; Edwin Kempson, a house master of Marlborough College, who had some twelve years of winter and summer mountaineering in the Alps to his credit; Dr. Charles Warren, who had had previous Himalayan experience as a member of Marco Pallis' expedition in 1933; and E. H. L. Wigram, a medical student at St. Thomas', the youngest member of the party. The last three named had all been members of the Cambridge University Mountaineering Club which has already produced such a remarkable number of Everest climbers of note.

The party assembled in Darjeeling about May 21 and were ready to move off three days later. We took with us as interpreter Karma Paul, who has served on all the Everest Expeditions except the first, and fifteen Sherpa and Bhotia porters amongst whom were our old friends Angtharkay, Passang Bhotia, Tsering Tharkay, and Rinzing. Our passport had not yet arrived from Lhasa, and this caused us some anxiety; but on the way up to Lachen we met Rai Bahadur, the personal assistant of Mr. Williamson, who kindly gave us a temporary pass to cross the frontier. We entered Tibet by way of the Kongra La at the head of the Lachen Valley. This, by the way, would be an infinitely preferable route for the main expedition if the pass were fairly clear of snow by the beginning of April, which I have reason to believe is the case in a normal season. The heavy transport need not accompany the climbers on this portion of the march. For our purpose there was no need to go straight to Mount Everest, and we hoped to be able to see something of the beautiful Nyonno Ri range which had attracted Wager and me so much in 1933. From Gompa Lawu across the Kongra La we struck due west, thus avoiding Kampa and Tengkye Dzongs. We lived mainly off the country and our diet consisted largely

of tough mutton and eggs. We were able to obtain large quantities of the latter at each village and frequently consumed as many as a hundred amongst the seven of us in a single day. Once, when the party was split up, four of us ate a hundred and forty in one day. They were by no means always fresh and had to be scrambled in order to disguise the bad ones.

We reached Sar on June 8, and the party was divided into three: Spender with a group of Sherpas selected for their intelligence was to photograph the eastern aspect of the range from the rounded hills above Sar. This he succeeded in doing with characteristic thoroughness. He occupied five stations in ten days. Tilman, Kempson, and Warren, were to attempt to climb Nyonno Ri itself and also to explore the southern part of the range, taking with them the light photo-theodolite; while Bryant, Wigram and I would attempt to cross a high pass to the north, examine the interesting basin lying immediately to the west of the main watershed and return by some southern pass, thus completing the circuit of the main massif. We agreed to return to Sar after ten days.

Tilman and his companions encountered considerable difficulties on Nyonno Ri and failed to reach the summit. They had an interesting time however and did some useful work in the southern part of the range. We got over our pass and found ourselves in a strange basin completely surrounded by snow peaks. There were extensive areas of rich pasturage and we found that it was used as a grazing ground by the inhabitants of the Kharta Valley. We had a delightful time exploring this beautiful country. From various hills which we climbed we obtained views of Mount Everest and Makalu, and it was interesting to note that although it was already the middle of June these peaks were still clear of monsoon cloud, and there seemed to be little wind on them. Evidently this would have been a good season for an attempt on Everest. May we hope for a similar one next year. As I had hoped we managed to cross a pass to the south of Nyonno Ri and so returned to Sar.

Thus the parties were occupied until June 20, and I now hoped to be able to examine the southern extremity of the range. But unfortunately on our return we learned that this diversion from the usual route was not approved by the Tibetan authorities and in obedience to their wishes we proceeded as directly as possible to the Rongbuk valley. Now as in 1933 we were received with the greatest possible courtesy and hospitality by the Tibetans. The head man of Sar gave us free use of his house. He held several banquets at which we were fed lavishly and entertained by music and dancing. Our host was a great connoisseur of "Chang" and it was no penance to drink with him. The evenings occasionally became somewhat boisterous. Several times this year I took the opportunity of tactfully asking these head men the reason for their objecting to Europeans entering their country. In each case they replied that they believed that money and Western civilization could do nothing for them but promote unhappiness. I feel sure that the British Government would wish that this point of view should be respected.

We left Sar on June 26 on which day the first rains fell over the country, indicating that the monsoon had arrived, and we reached Rongbuk in nine marches, arriving there on July 4. We were delighted to find that our old friend the abbot of the monastery was alive and well. He received us with his usual good humour and gave us a good deal of sound mountaineering advice.

The highest peak of Lingtren from the ea

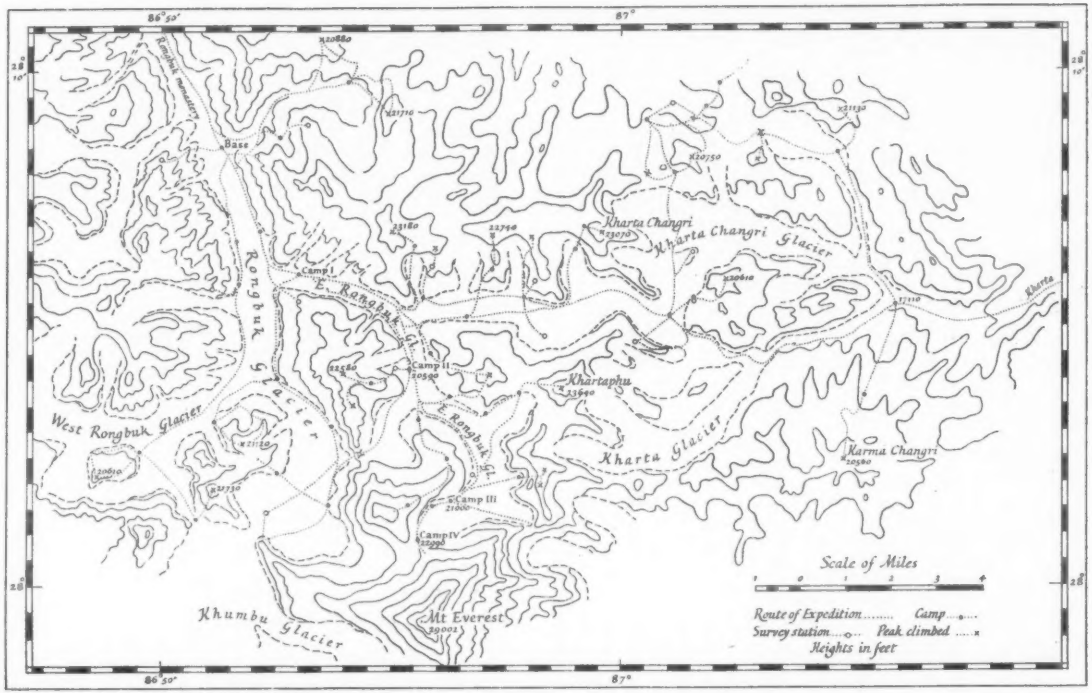
North-eastern aspect of Mount Everest from the summit of Khartaphu
[*Telephoto*]

Kharta Changri from the east

The whole party, with the exception of Karma Paul, left the Rongbuk Monastery on July 6 in gloriously fine weather, taking with us sufficient food for five weeks, and forty Tibetans to carry our gear as far as Camp II. We left Spender and his cameras, together with a few of the older and more experienced Sherpas, at the old base camp and went on ourselves to Camp I the same day. While we made our way up the glacier to Camp III the weather continued fine and the north face of Everest became quite black and soon began to resemble the mountain in its pre-monsoon aspect. The days were hot and windless, the nights clear and cold, and it was difficult to imagine how the slopes of the North Col could be in anything but perfect condition by the time we reached them. Bryant unfortunately now became ill and had to be left behind at Camp I to follow up when he had recovered.

We reached Camp III on July 8 without much incident or effort and had enough food there to last us for three weeks, having dumped the rest at Camp II. The next day the weather became unpleasant, though very little snow fell. We spent the day moving camp farther up towards the North Col. A few hundred yards above Camp III, in fact within sight and hail of it, we came upon the body of Maurice Wilson. It was evident that he had died in his sleep from exhaustion and not from starvation, as he had found a dump of food which had been left in 1933 and which was still well stocked.

A great deal has been said about the danger of snow avalanches on the North Col. Exactly why these slopes should differ from any others at a similar altitude it is difficult to say, but the memory of the disastrous avalanche of 1922 is partly responsible for the extreme caution with which subsequent parties have tackled them. *We* regarded the North Col with the same respect and were determined not to run any risk with snow which we considered to be in the least bit doubtful. Kempson had had very considerable experience of winter snow conditions in the Alps, while I imagined I was familiar with a fairly wide range of Himalayan snows. The weather conditions for the past week had been ideal for packing the snow, and although we examined carefully each section of our route we could not detect anywhere the slightest tendency to avalanche. In detail the aspect of the North Col had changed considerably since 1933. The middle section of our old route, known to us as the Punch Bowl, and the 30-foot wall above it were contorted beyond recognition into a mass of tottering séracs, which would have rendered the 1933 route exceedingly difficult, if not impracticable. A tongue of ice a few hundred feet to the right had protruded somewhat and now provided us with comparatively easy access to the old site of Camp IV. The ledge on which this camp had been had now completely disappeared, and the ice was far too steep for us to think of pitching a tent. In the upper section great bulges of ice forced us to traverse right across the face before we could climb to the crest of the col which we reached at a point very close to the site of our old Camp IVa. The big Arctic tent and the food dump which we had left in 1933 were buried under some 8 feet of (presumably) monsoon snow. For three days we worked on the ice slopes of the North Col and by July 12 we had established a camp at the foot of the north-east ridge and stocked it with sufficient food and fuel to last us for fifteen days. It was occupied by Kempson, Warren, and myself, and nine Sherpas. Our plan was to take a light camp up to 26,000 feet and from there


86° 50'
87°
28° 10'
28°
Rongbuk monastery
Base
Camp I
Rongbuk Glacier
Rongbuk Gl.
West Rongbuk Glacier
Camp II 20500
Camp III 21000
Camp IV 22000
Khartaphu 23640
Kharta Changri 23070
Kharta Changri Glacier
Kharta Glacier
Karma Changri 20500
Khumbu Glacier
Mt Everest 29002
Scale of Miles
Route of Expedition..... Camp
Survey station Peak climbed
Heights in feet

to investigate the snow conditions on the slabs of the upper part of the mountain and to reconnoitre some of the ground about which there has been so much debate.

We had established ourselves on the North Col in less than a week after leaving Rongbuk, and it seemed advisable to spend the next two or three days in rest and acclimatization. The weather was bad and we were worried by a nasty wind which was particularly fierce at night. We spent four uncomfortable days waiting for better weather, during which time we went some way up the ridge. As time was of no particular object and our job was to keep a watch on the mountain during the whole of the monsoon, we had made up our minds that we should not force our way up in bad weather. It seemed a waste of time to hang about doing nothing, so we decided to leave on the North Col all the food and fuel we had with us and what tents and equipment we could spare and descend to Camp III to spend our time climbing other peaks in the vicinity until the weather improved. We could then return to the North Col without being obliged to carry anything further up there. With this plan in view we started to descend on the morning of July 16. Although the weather had been bad, only a few inches of new snow had been deposited on the mountain during our stay on the North Col and although we tackled the slopes below with extreme caution they did not seem to have altered materially since we had last seen them. We descended in two parties: Kempson and I were in front with five Sherpas, while Warren was some way behind with the other four. We had not gone far before we were brought up short at the brink of a sudden cut-off which stretched for several hundred yards in either direction. This indicated that an enormous avalanche had recently broken away largely along the line of our ascending tracks. In fact the whole face of the slope had peeled off to a depth of 6 feet. This was an alarming discovery and there followed a somewhat heated debate as to whether we should retreat to the North Col or carry on down. The others advocated the former course; but it seemed to me that if, as we had reason to suppose, the avalanche had occurred on the previous night its track must indicate a temporary line of strength, and it was not likely that another avalanche would fall immediately, while if we returned to the North Col we would later have to face a risk which we had no means of gauging. Anyway my argument was the simpler to put into effect and so we crept down with our hearts in our mouths and reached the glacier unharmed.

To my mind the incident had considerable significance. As I have said, very little new snow indeed had been deposited on the slopes and this cannot have had any appreciable effect on the stability of the old snow which we had unanimously agreed seemed perfectly sound. And yet the avalanche had occurred along our ascending route. That merely indicated that we were not competent to judge the stability of monsoon snow at these altitudes. Anyway I decided there and then to abandon our stores and have nothing further to do with the North Col during the monsoon. Later we were to have substantial evidence that the monsoon snow does not either disappear or consolidate at an altitude higher than 23,000 feet in the region of Mount Everest. We were thus able to provide a definite answer to one of the chief problems which we had come out to solve. In my opinion the only time of

year that one can reasonably hope to reach the summit of Mount Everest is during the exceedingly short interval between the end of the winter gales and the arrival of the monsoon. In 1933 there was no such interval.

When we reached Camp III we found a note from Tilman saying that he and Wigram had gone down to Camp II to bring up more food. They had climbed two peaks of over 22,000 feet in the neighbourhood. On the next day, the 17th, we moved a camp up to the head of a big unnamed glacier which flows into the East Rongbuk from the east. From here we climbed the peak known as Khartaphu—23,600 feet high. We carried the light theodolite with us, but before we could reach the summit clouds had rendered it impossible to do any useful work. However we managed to get some fine views into the country to the east which later proved to be very useful to us. We also took some telephotos of the summits of Everest and Makalu. We descended to Camp II the next day where we met Spender. He had completed several stations on both sides of the Main Rongbuk Glacier and had obtained sufficient data to enable him to draw a large-scale plan of the north face of Everest and to calculate with sufficient precision the altitude of any point on that face, both of which achievements will be extremely useful in planning a fresh assault on the mountain.

The party was now divided into two. Spender, Kempson, and Warren were to attempt to explore the country lying between the East Rongbuk Glacier and the Doya La while the rest of us remained in the vicinity of Camp II. We moved across to the east and climbed the much-photographed Kellas Rock Peak, 23,000 odd feet. This mountain has so often appeared in newspapers under the name of "Mount Everest" that we experienced quite a thrill in reaching its summit. There, as on Khartaphu, we found that there was a very marked and sudden change in the quality of the snow as we reached 23,000 feet. The snow on the ridges below was good and safe, but that lying above 23,000 feet had always to be treated with the utmost caution. After returning to Camp II we climbed the beautiful ice peak which rises above it—it is 22,580 feet high. After this we explored the little valley which joins the main Rongbuk Valley on the east, and climbed two more peaks of 21,000 feet in the neighbourhood. This was done in order to be able to supplement with photographs the work which Spender had done in this valley a fortnight before. We returned to Rongbuk on the 31st and were surprised to find that Kempson was already there. A series of misfortunes had prevented them from completing the task they had set out to do. Their food supply had run short; they had encountered vile weather which seems to pour up through the Arun Gorge during the whole of the monsoon; two of their Sherpas had developed dysentery, and Spender himself had developed a complaint with disturbingly similar symptoms. However they had done some very good work. Spender had completed several good stations in the vicinity of what had come to be known as the Kharta Changri Pass, while Kempson and Warren had climbed two peaks of over 22,000 feet, up one of which they had taken the light photo-theodolite. They also climbed the beautiful peak of Kharta Changri which is just over 23,000 feet high. The rest of the party arrived in heavy rain that evening and the next two days were spent in devouring the luxuries which Karma Paul had collected in our absence and which consisted of two sheep,

twenty-one dozen eggs, and a little rancid butter. Tewang and Namgir, the two sick Sherpas, were discharged. The party was greatly weakened by the departure of Kempson, who had to return to England.

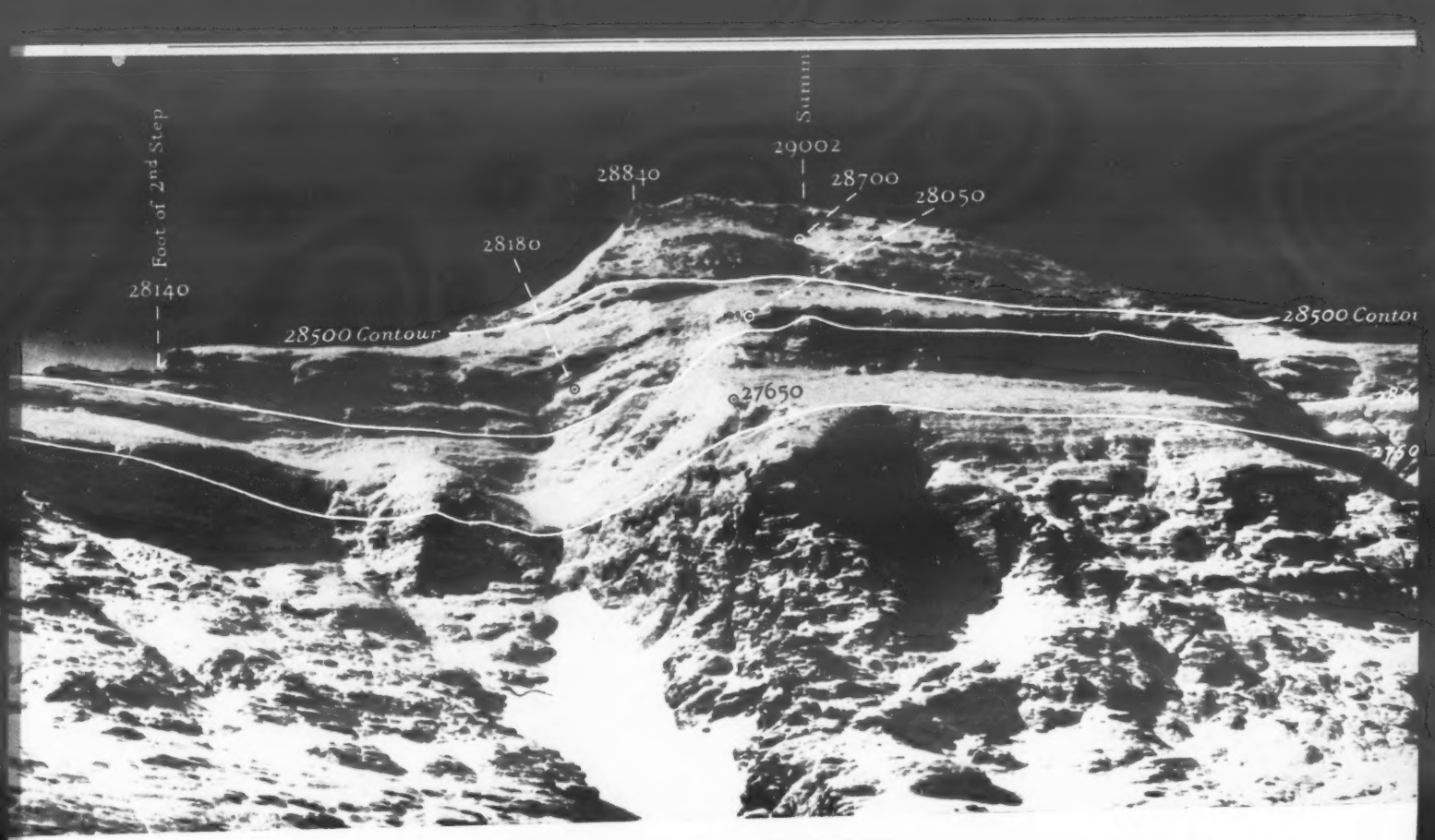
Our next intention was to examine the western side of the mountain. Although Mallory in 1921 had visited the watershed in two places he had experienced bad weather while doing so and had not seriously commented on the mountaineering aspect of the southern side. Another task we had was to report on the feasibility of the suggested route up the north-west ridge of the mountain. Tilman, Wigram, Bryant and I left Rongbuk on August 3 making towards the head of the main Rongbuk Glacier. Warren stayed behind with Spender who was still sick. Some days later these two followed us up and completed Spender's work on the north-western aspect of the mountain. After two days' march up the west side of the main valley we divided our forces into two. Tilman and Wigram were to attempt to cross the Lho La to the foot of the Western Cwm while Bryant and I went up the West Rongbuk Glacier. We climbed two peaks, one a fine fluted-ice peak which commanded one of the most magnificent mountain views I have seen, the other Lingtren Nup up which we managed to take the theodolite for a round of angles and photographs. After this we took a camp on to the crest of the watershed and stayed there for two stormy nights. On August 10 from this camp we climbed the triangulated peak, 21,730 feet. The day was an adventurous one. Conditions rendered the climb a very delicate job; on the descent while we were making our way along a narrow ice ridge I heard a roar like a heavy gun going off, felt a jerk of the rope round my waist which nearly cut me in two, and found myself standing alone on the ridge. Bryant had broken away a bit of cornice, had gone down with it, and was now almost hanging on the other end of the rope some way below the crest of the ridge; but he had retained possession of his axe and was thus able to cut his way back to me. Later in the descent we got involved in a small snow avalanche which, fortunately, we were expecting. Early on the following morning, having spent an entertaining night trying to drown the noise of the wind with some of Bryant's extraordinary repertoire of comic songs, we erected the theodolite with considerable difficulty on the crest of the pass and took a round of angles and photographs. Unfortunately the photographs were spoilt by the film jamming in the camera. However we secured several somewhat cloudy views over that interesting section of Nepal which the Sherpas refer to rather vaguely as Sola Khombu. We also saw up into the mysterious Western Cwm. No descent is possible on the southern side of this col, and we were sorely tempted to try to find an exit from the basin of the West Rongbuk Glacier to the west but we had agreed to reassemble at Rongbuk on August 14. On our return there we learnt that Tilman and Wigram had found that there is no route southward from the Lho La, and having climbed a peak in its vicinity, had crossed a difficult pass lying immediately north of the North Peak and descended direct to Camp II. They had then climbed two more 22,000-foot peaks before returning to Rongbuk. While at the head of the main glacier they had found time to examine thoroughly the lower section of the north-west ridge which had been strongly recommended as an alternative route up Mount Everest. They were both convinced that an attack from this quarter would not offer the slightest

chance of success. From the mountaineering standpoint these two had put up a fine performance.

After two days' rest we set off once more up the East Rongbuk Glacier, having instructed Karma Paul to meet us in three weeks at Kharta with such surplus gear as remained. Our first objective was the North Peak, though Tilman's report of increasingly bad snow conditions above 22,000 gave us some misgivings as to the advisability of attempting a peak of nearly 25,000 feet at this time of year, and we bitterly regretted having left this until so late. We had two main objects in climbing the peak: one was to be able to secure some telephotographs of the upper part of Everest from its summit, the other was to collect further evidence of the behaviour of monsoon snow at these extreme altitudes. From Camp II we made our way up to and along the great horseshoe ridge of the mountain. We found that the snow was in a frightful condition and the higher we got the worse it became. We had three camps on the mountain, the highest of which we placed at about 23,200 feet, almost directly above the North Col. In order to reach it we had to flog our way through snow up to our waists. The weather was bad and at this camp we spent one exceedingly unpleasant night. Our primus stove ceased to function as the jets were too large for that altitude and we could not melt enough snow for drinking. The next morning we started at dawn but found that the snow was worse than it had been below and soon we were floundering in a seemingly bottomless morass. From where we were we could look down on to the North Col and could see that the large Whymper tents which we had left there in July were now buried under fresh snow. The final ridge of the North Peak we found to be very sharp and under the existing snow conditions it was impossible to reach the summit, and we were regretfully compelled to abandon the struggle. When we regained the East Rongbuk glacier the next day we found Spender waiting for us in the central trough, having completed with much difficulty two stations in the Eastern Cwm.

The next fortnight was spent in making a high level route between the East Rongbuk Glacier and the Doya La above Kharta. It was certainly the most delightful two weeks of the expedition and yielded the most interesting geographical results. We crossed the Kharta Changri pass to what Spender with his arctic terminology had called the Ice Cap Station. Indeed the upper glaciers of this district appear to resemble closely those of the Greenland ice cap. But in their lower reaches they are very Himalayan in character and take a great deal of negotiating. From here we had a delicious time crossing new passes, climbing peaks and unravelling the most interesting mountain topography. The mornings were generally fine, which allowed us to work in camera stations at suitable points all along our route. When we reached the Doya La we experienced again that indescribable pleasure of coming down to living things after a long sojourn in high glacier regions. The smell of grass and flowers was almost intoxicating. On September 6 we reached Kharta, where we hired ponies and hurried as fast as these would carry us to the Choten Nyima La. We spent the remainder of our time climbing in the little-visited Dodang Nyima Range of North Sikkim. As is generally the case, the results of the expedition fell short of our hopes, but our inability to wander far afield enabled us to do more mountaineering than we had intended. Twenty-

A basin west of Nyonno Ri



Summit of Mount Everest from the North Col

[Tabul... heights and ... ed at the Geodetic Institute, Copenhagen]

six peaks, all over 20,000 feet high, had been climbed, the summits of only two of these had previously been reached.

DISCUSSION

Before the paper the PRESIDENT (Major-General Sir PERCY COX) said: It is very cheering, judging by the size of the audience, to see that Mount Everest is still a good draw. The paper we are to hear is on the Reconnaissance Expedition of 1935 by Mr. Eric Shipton. He will tell us the origin of the expedition and the conditions under which he led his party last summer. I will merely say a word or two to give you the background and refresh your memories.

When the 1933 Expedition came home, the earthquake in Nepal and the death of the Dalai Lama seemed to make it very unlikely that we should get permission for another expedition for some time to come; but the whole question was discussed and it was decided that one never knew when permission might be forthcoming. Some fortuitous event might suddenly make it possible for an expedition to make another attempt. Therefore it was decided to keep a watchful eye on opportunities for asking permission for another expedition. Unexpectedly in January 1934 we received that permission. It was not received in time to enable us to fit out a strong main expedition to attempt the summit during 1935, but we were loath to risk letting the permission lapse by not starting operations at once, so we decided to send out this reconnaissance under Mr. Shipton.

Mr. Shipton has a very fine record as a climber. Before he made any attempt at climbing in the Himalayas he climbed in Kenya with Mr. Wyn Harris, and he was one of those of the 1933 Expedition who very nearly got to the top of Everest. It will be remembered that he was with Mr. Smythe on the second assault. Afterwards, when the expedition returned to England, he was not to be denied, and made fresh plans for the following summer and did a fine piece of mountaineering by penetrating into the basin surrounding Nanda Devi. On his return he read us a paper on that subject. He is now to tell us of his experiences on the Everest reconnaissance in 1935.

Mr. Shipton then read the paper printed above, and a discussion followed.

The PRESIDENT: I call first upon Mr. Hugh Ruttledge, who led the 1933 Expedition and is going to lead the 1936 Expedition.

Mr. HUGH RUTTLEDGE: I wonder if all of us have realized, when listening to Mr. Shipton quietly describing his adventures, exactly what has been done during 1935, because the achievement which he has been describing so quietly is one of the most remarkable in Himalayan annals. Quite casually at the end of his paper he said that twenty-six peaks of over 20,000 feet had been climbed. If he had told you that he had entered twenty-two public houses this afternoon it would have sounded much more exciting.

But actually what has been done during 1935? Firstly, I think this performance has proved beyond reasonable cavil the right season for attempting to climb Mount Everest. Many people have sincerely believed that we were making a mistake in not attempting the mountain during the monsoon or, at any rate, just after it. I think the party's experiences this year have put that out of court. Secondly, the mountaineering judgment of Mallory in 1921 has been fully vindicated. It has been put beyond reasonable doubt that it is not the slightest use attempting the great north-west *arête*, which to one or two mountaineers has seemed rather attractive. That was seen at close quarters, and certainly that route will not do. Thirdly, we are pretty certain now, as I think

Summit of Mount Everest from the North Col

we were practically certain in 1933 also, that the proper route of ascent is that traverse which Brigadier Norton discovered with Somervell in 1924.

Fourthly, and most important, the monsoon snow conditions above 23,000 feet have been found to be difficult and dangerous; but more than that, the conditions on the North Col itself have been very thoroughly explored. Nothing but the most superb mountaineering judgment and skill would have got that party down off the North Col in the way it was done, and we must all endorse Mr. Shipton's judgment in coming straight down after that huge avalanche had fallen. None but mountaineers can understand. You saw that long line across the snow face of the North Col; that probably represented an avalanche of many hundred thousand tons of ice and snow, and it swept right across the route of ascent. Mr. Skipton was absolutely right to have nothing to do with the North Col after such a happening as that. So we must try to get up the mountain next year between, shall we say May 15 and, in more or less normal conditions, June 7. This year of course was an exceptionally favourable year in some ways, possibly the period during which the mountain might have been climbed may have been a little longer, say to June 14. You will remember that Mr. Shipton told us the monsoon did not break until about June 26, but probably the snow conditions were getting steadily worse by that time and a little before.

Fifthly, there is the fact that this party has subjected itself to that intensely exacting ordeal of acclimatization. I believe it is a fact that no test is known to medicine by which it can be proved how a man will react to very high altitude conditions. The party that was sent out this year had to undergo that test and, most unhappily, all did not pass it. They were all first-rate men, but it was the only thing to be done, and we can at least say that as a result of this test the nucleus of next year's party consists of men who have been thoroughly tried out and are known to be able to climb at those altitudes. That gives us a very much better chance of success in 1936.

In conclusion, may I congratulate not only Mr. Shipton on his extraordinarily fine leadership and judgment but also all the members of his party. I think I am right in saying that only two of the others have been in the Himalayas previously, but all climbed like veterans. I must not forget the fine performance put up by Mr. Spender who, I believe I am right in saying, had not done much climbing before he went with the party. How he got to some of his stations and did that valuable work for us in examining the north face of the mountain I do not know. Certainly he will train to be a good mountaineer if he is interested.

Finally may I say for myself that it is with a very deep sense of privilege and of responsibility that I am going to do my very utmost in 1936 to place these splendid climbers in an attacking position.

The PRESIDENT: We have Mr. Spender and Mr. Kempson with us. I am going to ask them to come up in turn. Mr. Spender, as you have heard, was the scientific element in the expedition and did very valuable work on the topography of the untrodden mountain region which the party were exploring.

Mr. MICHAEL SPENDER: I think the best contribution I can make to this evening's discussion is to say something as shortly as I possibly can about weather in general and Mount Everest weather in particular: it helps one to understand what happened to us and it may help others to understand what happens to next year's party.

As you all know, the typical feature of the weather which is met by the party which goes out before the monsoon is a frightful north-west wind, a wind of very great persistence and very cold. This year's party went out later in the year, at a time when the north-west wind would be weaker. It went out at the same time as Colonel Howard-Bury's party went out in 1921, and we could look

to them for an account of the kind of weather we might meet. So we borrowed the Secretary's copy of the account and read about their kind of weather and, Mr. President, we were depressed because they had a dreadful time in 1921; a time of perpetual cloudiness and frequent snowfall. We thought it might be difficult to take photographs under such conditions and that even the mountain climbers might lose their enthusiasm. So when we finally got to Rongbuk and the sun shone and the snow peaks gleamed we were very gratified.

As the season went on there was a worsening and unfortunately the day Shipton was on the North Col, July 15, was a very bad day indeed. By August 15 the worst of it was over. But even when it was at its worst the weather did not give us bad days in succession. There would be one bad day and then we were able to get on with the job the next day. It was not as in the Alps, where bad days come in such long periods as to make one restless. Those single bad days were welcome to us as periods of rest.

The principal point is that the north-west wind is the dominant factor. You must think of the monsoon as a great mass of warm air trying to trespass on the rightful stream of air for those parts. This has actually a very curious effect; for when you get the bad weather in the monsoon period it appears to come from the north and our joke was to call it the Gobi Desert monsoon. The real monsoon splits round the land mass of India into two branches, one of which comes from the Arabian Sea direction and the other makes a sort of flanking attack along the east coast. The first, the Arabian Sea monsoon, hardly ever gets to Mount Everest: it is the second wind that really brings the bad weather.

When the monsoon first comes up towards India the layer of warm air is only a few thousand feet thick, and it has no chance of reaching the summit of the Himalayas. But when you have a front of warm air advancing against this north-west stream of cold air, all sorts of disturbances are set up which develop into the storms which wander up and down and to and fro till they strike the Himalayas. When the first of these disturbances gets to Mount Everest there is some cloud and snowfall, and the expedition telegraphs back "The monsoon has broken." Well, that is just as you like to take it because the real mass of warm air has not yet reached Everest. That will come later on. Until the warm air gets to Everest there may be longish periods of fine weather, although there is always the risk of other circumstances coming in.

We got to Rongbuk just at such a fine period. We left it on July 6 in the most beautiful weather, when Mount Everest and all the other high peaks were glittering with new snow and there seemed to be no wind or cloud. But as we went on, and even until the beginning of August, we only got the warm air in fits and starts. From August 9 for a few days we had stormy weather, and it was very difficult to go on with my sort of work. That was the period when Mr. Shipton and Mr. Bryant were climbing together, and they had an uncomfortable night and very bad snow conditions. A few days later, when Shipton was at 23,000 feet on the North Peak, there were only 3° or 4° of frost at night.

The reason things were like this in the summer was because the north-west wind held its own more effectively than it generally does. The Bengal Bay monsoon actually was blown sideways by the north-west wind. Those of you who have had reports from India are already aware that Calcutta had only half its former rainfall and that Lower Bengal in general was very short of rain. On the other hand, Assam, Upper Burma, and Sikkim had too much, as we saw when we came back to Sikkim: roads had been washed away, bridges were down, and so on. Very probably Tibet had a good supply of rain, and we came in for the benefit of that because as we walked home we walked through good crops which the headmen were kind enough to credit in part to us.

On the whole, we really had finer weather than we should have had, and the little bit of bad weather we had in August was due to a disturbance skirting the foothills of the Himalayas and drawing up the warm air into the mountains; but as soon as that was past the north-west wind came in again and you could see it blowing over the top of the warm monsoon air. As August came to an end we watched the north-west wind gradually deepening and gradually pushing before it the warm summer air and taking the clouds away from the regions visited by the monsoon

Mr. E. G. H. KEMPSON: Acclimatization, I am afraid, is as necessary in speaking in public as it is in mountaineering, so I shall not detain you for more than a minute or two. There is one thing Mr. Shipton told you that I should like to underline, and that is the remarkable change in conditions that appears as you rise from the 21,000-foot level to the 23,000-foot level and above. On the occasion when Dr. Warren and I were climbing Kharta Changri we had a delightful camp on the glacier at 21,000 feet; it was a beautiful crisp night, with 30° of frost and actually the coldest night we had during the usually temperate monsoon weather. When we started up our peak it was perfect alpine weather. We got on to our col just making nicks with our feet in the ice, but as we rose to about 22,000 feet conditions got progressively worse. First we found crust such as you sometimes, unfortunately, get in spring ski-ing; then this degenerated into the powder snow of which you have been hearing. The worst characteristic of that powder snow was the fact that the steeper it got the deeper it got: progress was very slow. We actually took four hours getting to the top of our peak whereas it took us only thirty-five minutes to come down. This gives a measure of the work in the ascent.

I cannot close without saying two things: first, and you all know it, the porters that we had were simply superb. Some of us started by being just a little ashamed of not carrying enormous loads when every one round seemed to be carrying 60 and 80 lb., but you get over that after a bit. The porters were really quite first rate, and my porter who came back to Darjeeling through Tibet with me was one of the best. Secondly, and this I also need scarcely say, I cannot tell you what an excellent leader we had in Shipton. He left out one point about himself. He suggested that he always ate a great deal. Well, perhaps he did when he was in the valleys but he was an astonishing person up high. He seemed to subsist on nothing, though he himself would dispute that fact and blame all of us for eating nothing. But that is the only fault I can find in him. It is sufficient to say that our party under his leadership had not a single quarrel.

The PRESIDENT: Colonel Howard-Bury who led the original reconnaissance expedition is here. We shall be very disappointed if he will not give us a few words. It must have been of great interest to him to compare his own experience with what he has heard to-night.

Colonel HOWARD-BURY: I came here this evening to try to recall some of the old places that I had seen about fifteen years ago, but I should really like to congratulate Mr. Shipton on those wonderful photographs he has shown. He mentioned the enormous consumption of eggs on the way up. I should like to ask whether they were chickens' eggs, for on our way up we were presented with wild geese eggs, and we could not possibly have competed with the 1935 party's consumption. Further, I would like to ask him whether he was also given eggs on the way down. The children found out that we liked eggs very much and kept the eggs all the summer, offering us them in the autumn, and being surprised that we would not have anything to do with them as food!

What has interested me enormously is that Mr. Shipton has taken a totally different route from other expeditions. We only saw the map for a short time,

but the way he went to Mount Everest was completely new. All along, he has been through a new line of country, and though he has told us very little about the geographical work that has been done, I am sure that a great deal of most useful geographical work has been achieved in the reconnaissance that he has done this year. For whereas in 1921 we went along, I might say, the valleys, he seems to have been going along the tops of the peaks the whole time. But he has borne out very much what we found out round Mount Everest about climate. We were there throughout the whole summer and until comparatively late in the autumn. We too found that there was that heavy snowfall and that the mountain looks completely different in the autumn from what it does in the spring, when it looks quite black. Then there is that perpetual terrible wind that begins after the monsoon and blows with increasing force the whole time. Clouds of snow blown off from the summit of the mountain render a climb after the monsoon quite impossible. I am glad it has been again established that at that time it is no use attempting to climb the mountain.

I congratulate Mr. Shipton most heartily on his expedition, on the geographical work that he has done, and on the most excellent photographs that he has taken.

Dr. T. LONGSTAFF: I am glad to have the opportunity of paying my compliments to Mr. Shipton. I do not think he has made it evident that during the expedition last summer about as many peaks of over 20,000 feet were climbed in the Himalaya as have been climbed since the days of Adam, so far as I remember the list.

I would also like to say that I am as firmly convinced as ever that his system of sending people up to 20,000 feet and over as often as possible and bringing them down again is the best form of acclimatization that there is; that it is a very much better method of acclimatization than keeping people permanently at a high altitude, and I have no doubt the climbers who were with Shipton will show that that form of acclimatization remains with them permanently. The oftener you go to 20,000 feet the better able are you to go again, but if you stay for a great length of time at a high altitude your general condition degenerates.

I must also congratulate Mr. Shipton on the extremely economical way in which he conducted the expedition. He has always been a shining example in that respect, yet although the expedition's work was executed with great financial economy you will notice that he did not grudge his party 140 eggs a day! If we can manage to collect a team of mountaineers of the technical capacity of Mr. Shipton there is no doubt that Mount Everest will be climbed, given the luck of the weather.

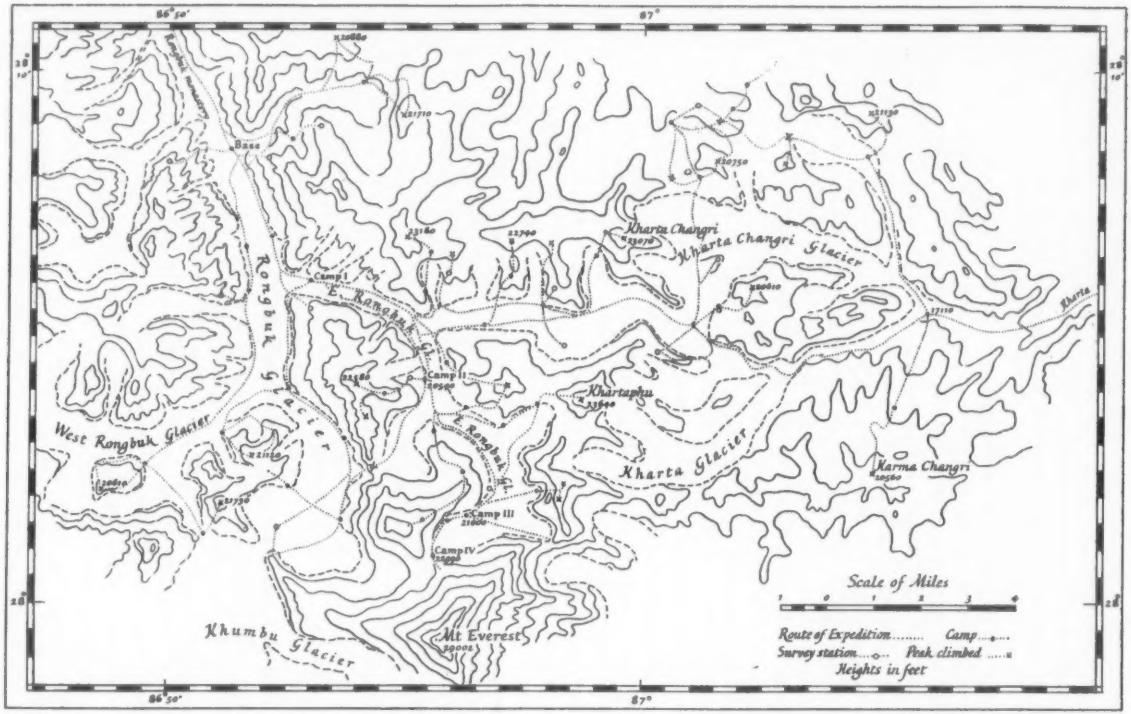
The PRESIDENT: It may interest you before we close this meeting if I let you know the names of those who have been invited and have accepted the invitation to be members of the 1936 Expedition. Mr. Hugh Ruttledge will lead, as you know, and I am very glad to say Mr. Smith Windham will take charge of the wireless; Mr. F. S. Smith, whose climbing reputation you know; Mr. Shipton; Mr. Wyn Harris, who did so well in 1933, coming from Kenya again; Mr. Kempson, whom you have just heard and who well won his spurs on the recent reconnaissance; Dr. Warren, who was with Mr. Shipton; Mr. Wigram and Lieutenant J. M. Gavin, R.E.; Major Morris, a retired officer of the 3rd Gurkhas, who has been in Nepal and is on his way to Darjeeling, and whose business it is to collect the Sherpa porters and run the transport. Finally Dr. Noel Humphreys, whom all of you know by name and who has recently returned from an expedition which he led to Greenland with Edward Shackleton. That makes eleven; there is one more place to be filled.

Now to say a word of thanks to Mr. Shipton. It is an astonishing accomplishment that they should have been able to climb successively twenty-six fine

The whole party, with the exception of Karma Paul, left the Rongbuk Monastery on July 6 in gloriously fine weather, taking with us sufficient food for five weeks, and forty Tibetans to carry our gear as far as Camp II. We left Spender and his cameras, together with a few of the older and more experienced Sherpas, at the old base camp and went on ourselves to Camp I the same day. While we made our way up the glacier to Camp III the weather continued fine and the north face of Everest became quite black and soon began to resemble the mountain in its pre-monsoon aspect. The days were hot and windless, the nights clear and cold, and it was difficult to imagine how the slopes of the North Col could be in anything but perfect condition by the time we reached them. Bryant unfortunately now became ill and had to be left behind at Camp I to follow up when he had recovered.

We reached Camp III on July 8 without much incident or effort and had enough food there to last us for three weeks, having dumped the rest at Camp II. The next day the weather became unpleasant, though very little snow fell. We spent the day moving camp farther up towards the North Col. A few hundred yards above Camp III, in fact within sight and hail of it, we came upon the body of Maurice Wilson. It was evident that he had died in his sleep from exhaustion and not from starvation, as he had found a dump of food which had been left in 1933 and which was still well stocked.

A great deal has been said about the danger of snow avalanches on the North Col. Exactly why these slopes should differ from any others at a similar altitude it is difficult to say, but the memory of the disastrous avalanche of 1922 is partly responsible for the extreme caution with which subsequent parties have tackled them. *We* regarded the North Col with the same respect and were determined not to run any risk with snow which we considered to be in the least bit doubtful. Kempson had had very considerable experience of winter snow conditions in the Alps, while I imagined I was familiar with a fairly wide range of Himalayan snows. The weather conditions for the past week had been ideal for packing the snow, and although we examined carefully each section of our route we could not detect anywhere the slightest tendency to avalanche. In detail the aspect of the North Col had changed considerably since 1933. The middle section of our old route, known to us as the Punch Bowl, and the 30-foot wall above it were contorted beyond recognition into a mass of tottering séracs, which would have rendered the 1933 route exceedingly difficult, if not impracticable. A tongue of ice a few hundred feet to the right had protruded somewhat and now provided us with comparatively easy access to the old site of Camp IV. The ledge on which this camp had been had now completely disappeared, and the ice was far too steep for us to think of pitching a tent. In the upper section great bulges of ice forced us to traverse right across the face before we could climb to the crest of the col which we reached at a point very close to the site of our old Camp IVa. The big Arctic tent and the food dump which we had left in 1933 were buried under some 8 feet of (presumably) monsoon snow. For three days we worked on the ice slopes of the North Col and by July 12 we had established a camp at the foot of the north-east ridge and stocked it with sufficient food and fuel to last us for fifteen days. It was occupied by Kempson, Warren, and myself, and nine Sherpas. Our plan was to take a light camp up to 26,000 feet and from there


86° 50'
87°
28° 10'
28°
Rongbuk Monastery
Rongbuk Glacier
West Rongbuk Glacier
Rongbuk R.
Camp I
Camp II
Camp III
Camp IV
Kharta Changri
Kharta Changri Glacier
Khartaphu
Kharta Glacier
Karma Changri
Kharta
Khumbu Glacier
Mt Everest
Scale of Miles
Route of Expedition..... Camp
Survey station Peak climbed
Heights in feet

to investigate the snow conditions on the slabs of the upper part of the mountain and to reconnoitre some of the ground about which there has been so much debate.

We had established ourselves on the North Col in less than a week after leaving Rongbuk, and it seemed advisable to spend the next two or three days in rest and acclimatization. The weather was bad and we were worried by a nasty wind which was particularly fierce at night. We spent four uncomfortable days waiting for better weather, during which time we went some way up the ridge. As time was of no particular object and our job was to keep a watch on the mountain during the whole of the monsoon, we had made up our minds that we should not force our way up in bad weather. It seemed a waste of time to hang about doing nothing, so we decided to leave on the North Col all the food and fuel we had with us and what tents and equipment we could spare and descend to Camp III to spend our time climbing other peaks in the vicinity until the weather improved. We could then return to the North Col without being obliged to carry anything further up there. With this plan in view we started to descend on the morning of July 16. Although the weather had been bad, only a few inches of new snow had been deposited on the mountain during our stay on the North Col and although we tackled the slopes below with extreme caution they did not seem to have altered materially since we had last seen them. We descended in two parties: Kempson and I were in front with five Sherpas, while Warren was some way behind with the other four. We had not gone far before we were brought up short at the brink of a sudden cut-off which stretched for several hundred yards in either direction. This indicated that an enormous avalanche had recently broken away largely along the line of our ascending tracks. In fact the whole face of the slope had peeled off to a depth of 6 feet. This was an alarming discovery and there followed a somewhat heated debate as to whether we should retreat to the North Col or carry on down. The others advocated the former course; but it seemed to me that if, as we had reason to suppose, the avalanche had occurred on the previous night its track must indicate a temporary line of strength, and it was not likely that another avalanche would fall immediately, while if we returned to the North Col we would later have to face a risk which we had no means of gauging. Anyway my argument was the simpler to put into effect and so we crept down with our hearts in our mouths and reached the glacier unharmed.

To my mind the incident had considerable significance. As I have said, very little new snow indeed had been deposited on the slopes and this cannot have had any appreciable effect on the stability of the old snow which we had unanimously agreed seemed perfectly sound. And yet the avalanche had occurred along our ascending route. That merely indicated that we were not competent to judge the stability of monsoon snow at these altitudes. Anyway I decided there and then to abandon our stores and have nothing further to do with the North Col during the monsoon. Later we were to have substantial evidence that the monsoon snow does not either disappear or consolidate at an altitude higher than 23,000 feet in the region of Mount Everest. We were thus able to provide a definite answer to one of the chief problems which we had come out to solve. In my opinion the only time of

year that one can reasonably hope to reach the summit of Mount Everest is during the exceedingly short interval between the end of the winter gales and the arrival of the monsoon. In 1933 there was no such interval.

When we reached Camp III we found a note from Tilman saying that he and Wigram had gone down to Camp II to bring up more food. They had climbed two peaks of over 22,000 feet in the neighbourhood. On the next day, the 17th, we moved a camp up to the head of a big unnamed glacier which flows into the East Rongbuk from the east. From here we climbed the peak known as Khartaphu—23,600 feet high. We carried the light theodolite with us, but before we could reach the summit clouds had rendered it impossible to do any useful work. However we managed to get some fine views into the country to the east which later proved to be very useful to us. We also took some telephotos of the summits of Everest and Makalu. We descended to Camp II the next day where we met Spender. He had completed several stations on both sides of the Main Rongbuk Glacier and had obtained sufficient data to enable him to draw a large-scale plan of the north face of Everest and to calculate with sufficient precision the altitude of any point on that face, both of which achievements will be extremely useful in planning a fresh assault on the mountain.

The party was now divided into two. Spender, Kempson, and Warren were to attempt to explore the country lying between the East Rongbuk Glacier and the Doya La while the rest of us remained in the vicinity of Camp II. We moved across to the east and climbed the much-photographed Kellas Rock Peak, 23,000 odd feet. This mountain has so often appeared in newspapers under the name of "Mount Everest" that we experienced quite a thrill in reaching its summit. There, as on Khartaphu, we found that there was a very marked and sudden change in the quality of the snow as we reached 23,000 feet. The snow on the ridges below was good and safe, but that lying above 23,000 feet had always to be treated with the utmost caution. After returning to Camp II we climbed the beautiful ice peak which rises above it—it is 22,580 feet high. After this we explored the little valley which joins the main Rongbuk Valley on the east, and climbed two more peaks of 21,000 feet in the neighbourhood. This was done in order to be able to supplement with photographs the work which Spender had done in this valley a fortnight before. We returned to Rongbuk on the 31st and were surprised to find that Kempson was already there. A series of misfortunes had prevented them from completing the task they had set out to do. Their food supply had run short; they had encountered vile weather which seems to pour up through the Arun Gorge during the whole of the monsoon; two of their Sherpas had developed dysentery, and Spender himself had developed a complaint with disturbingly similar symptoms. However they had done some very good work. Spender had completed several good stations in the vicinity of what had come to be known as the Kharta Changri Pass, while Kempson and Warren had climbed two peaks of over 22,000 feet, up one of which they had taken the light photo-theodolite. They also climbed the beautiful peak of Kharta Changri which is just over 23,000 feet high. The rest of the party arrived in heavy rain that evening and the next two days were spent in devouring the luxuries which Karma Paul had collected in our absence and which consisted of two sheep,

twenty-one dozen eggs, and a little rancid butter. Tewang and Namgir, the two sick Sherpas, were discharged. The party was greatly weakened by the departure of Kempson, who had to return to England.

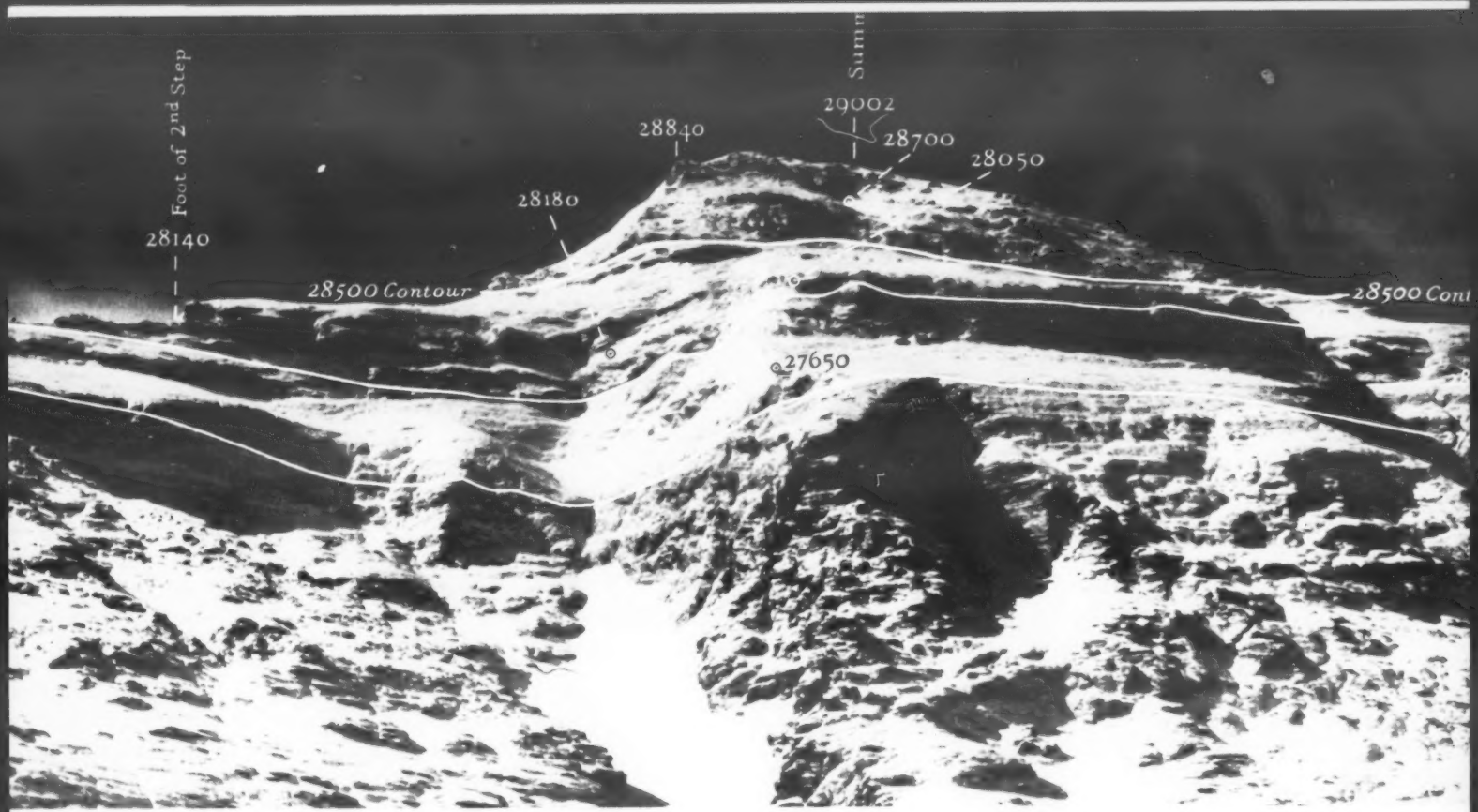
Our next intention was to examine the western side of the mountain. Although Mallory in 1921 had visited the watershed in two places he had experienced bad weather while doing so and had not seriously commented on the mountaineering aspect of the southern side. Another task we had was to report on the feasibility of the suggested route up the north-west ridge of the mountain. Tilman, Wigram, Bryant and I left Rongbuk on August 3 making towards the head of the main Rongbuk Glacier. Warren stayed behind with Spender who was still sick. Some days later these two followed us up and completed Spender's work on the north-western aspect of the mountain. After two days' march up the west side of the main valley we divided our forces into two. Tilman and Wigram were to attempt to cross the Lho La to the foot of the Western Cwm while Bryant and I went up the West Rongbuk Glacier. We climbed two peaks, one a fine fluted-ice peak which commanded one of the most magnificent mountain views I have seen, the other Lingtren Nup up which we managed to take the theodolite for a round of angles and photographs. After this we took a camp on to the crest of the watershed and stayed there for two stormy nights. On August 10 from this camp we climbed the triangulated peak, 21,730 feet. The day was an adventurous one. Conditions rendered the climb a very delicate job; on the descent while we were making our way along a narrow ice ridge I heard a roar like a heavy gun going off, felt a jerk of the rope round my waist which nearly cut me in two, and found myself standing alone on the ridge. Bryant had broken away a bit of cornice, had gone down with it, and was now almost hanging on the other end of the rope some way below the crest of the ridge; but he had retained possession of his axe and was thus able to cut his way back to me. Later in the descent we got involved in a small snow avalanche which, fortunately, we were expecting. Early on the following morning, having spent an entertaining night trying to drown the noise of the wind with some of Bryant's extraordinary repertoire of comic songs, we erected the theodolite with considerable difficulty on the crest of the pass and took a round of angles and photographs. Unfortunately the photographs were spoilt by the film jamming in the camera. However we secured several somewhat cloudy views over that interesting section of Nepal which the Sherpas refer to rather vaguely as Sola Khombu. We also saw up into the mysterious Western Cwm. No descent is possible on the southern side of this col, and we were sorely tempted to try to find an exit from the basin of the West Rongbuk Glacier to the west but we had agreed to reassemble at Rongbuk on August 14. On our return there we learnt that Tilman and Wigram had found that there is no route southward from the Lho La, and having climbed a peak in its vicinity, had crossed a difficult pass lying immediately north of the North Peak and descended direct to Camp II. They had then climbed two more 22,000-foot peaks before returning to Rongbuk. While at the head of the main glacier they had found time to examine thoroughly the lower section of the north-west ridge which had been strongly recommended as an alternative route up Mount Everest. They were both convinced that an attack from this quarter would not offer the slightest

chance of success. From the mountaineering standpoint these two had put up a fine performance.

After two days' rest we set off once more up the East Rongbuk Glacier, having instructed Karma Paul to meet us in three weeks at Kharta with such surplus gear as remained. Our first objective was the North Peak, though Tilman's report of increasingly bad snow conditions above 22,000 gave us some misgivings as to the advisability of attempting a peak of nearly 25,000 feet at this time of year, and we bitterly regretted having left this until so late. We had two main objects in climbing the peak: one was to be able to secure some telephotographs of the upper part of Everest from its summit, the other was to collect further evidence of the behaviour of monsoon snow at these extreme altitudes. From Camp II we made our way up to and along the great horseshoe ridge of the mountain. We found that the snow was in a frightful condition and the higher we got the worse it became. We had three camps on the mountain, the highest of which we placed at about 23,200 feet, almost directly above the North Col. In order to reach it we had to flog our way through snow up to our waists. The weather was bad and at this camp we spent one exceedingly unpleasant night. Our primus stove ceased to function as the jets were too large for that altitude and we could not melt enough snow for drinking. The next morning we started at dawn but found that the snow was worse than it had been below and soon we were floundering in a seemingly bottomless morass. From where we were we could look down on to the North Col and could see that the large Whymper tents which we had left there in July were now buried under fresh snow. The final ridge of the North Peak we found to be very sharp and under the existing snow conditions it was impossible to reach the summit, and we were regretfully compelled to abandon the struggle. When we regained the East Rongbuk glacier the next day we found Spender waiting for us in the central trough, having completed with much difficulty two stations in the Eastern Cwm.

The next fortnight was spent in making a high level route between the East Rongbuk Glacier and the Doya La above Kharta. It was certainly the most delightful two weeks of the expedition and yielded the most interesting geographical results. We crossed the Kharta Changri pass to what Spender with his arctic terminology had called the Ice Cap Station. Indeed the upper glaciers of this district appear to resemble closely those of the Greenland ice cap. But in their lower reaches they are very Himalayan in character and take a great deal of negotiating. From here we had a delicious time crossing new passes, climbing peaks and unravelling the most interesting mountain topography. The mornings were generally fine, which allowed us to work in camera stations at suitable points all along our route. When we reached the Doya La we experienced again that indescribable pleasure of coming down to living things after a long sojourn in high glacier regions. The smell of grass and flowers was almost intoxicating. On September 6 we reached Kharta, where we hired ponies and hurried as fast as these would carry us to the Choten Nyima La. We spent the remainder of our time climbing in the little-visited Dodang Nyima Range of North Sikkim. As is generally the case, the results of the expedition fell short of our hopes, but our inability to wander far afield enabled us to do more mountaineering than we had intended. Twenty-

A basin west of Nyonno Ri



Summit of Mount Everest from the North Col

[*Telephoto: heights and contours prepared at the Geodetic Institute, Copenhagen*]

Summit of Mount Everest from the North Col

[*Telephoto: heights and contours prepared at the Geodetic Institute, Copenhagen*]

six peaks, all over 20,000 feet high, had been climbed, the summits of only two of these had previously been reached.

DISCUSSION

Before the paper the PRESIDENT (Major-General Sir PERCY COX) said: It is very cheering, judging by the size of the audience, to see that Mount Everest is still a good draw. The paper we are to hear is on the Reconnaissance Expedition of 1935 by Mr. Eric Shipton. He will tell us the origin of the expedition and the conditions under which he led his party last summer. I will merely say a word or two to give you the background and refresh your memories.

When the 1933 Expedition came home, the earthquake in Nepal and the death of the Dalai Lama seemed to make it very unlikely that we should get permission for another expedition for some time to come; but the whole question was discussed and it was decided that one never knew when permission might be forthcoming. Some fortuitous event might suddenly make it possible for an expedition to make another attempt. Therefore it was decided to keep a watchful eye on opportunities for asking permission for another expedition. Unexpectedly in January 1934 we received that permission. It was not received in time to enable us to fit out a strong main expedition to attempt the summit during 1935, but we were loath to risk letting the permission lapse by not starting operations at once, so we decided to send out this reconnaissance under Mr. Shipton.

Mr. Shipton has a very fine record as a climber. Before he made any attempt at climbing in the Himalayas he climbed in Kenya with Mr. Wyn Harris, and he was one of those of the 1933 Expedition who very nearly got to the top of Everest. It will be remembered that he was with Mr. Smythe on the second assault. Afterwards, when the expedition returned to England, he was not to be denied, and made fresh plans for the following summer and did a fine piece of mountaineering by penetrating into the basin surrounding Nanda Devi. On his return he read us a paper on that subject. He is now to tell us of his experiences on the Everest reconnaissance in 1935.

Mr. Shipton then read the paper printed above, and a discussion followed.

The PRESIDENT: I call first upon Mr. Hugh Ruttledge, who led the 1933 Expedition and is going to lead the 1936 Expedition.

Mr. HUGH RUTTLEDGE: I wonder if all of us have realized, when listening to Mr. Shipton quietly describing his adventures, exactly what has been done during 1935, because the achievement which he has been describing so quietly is one of the most remarkable in Himalayan annals. Quite casually at the end of his paper he said that twenty-six peaks of over 20,000 feet had been climbed. If he had told you that he had entered twenty-two public houses this afternoon it would have sounded much more exciting.

But actually what has been done during 1935? Firstly, I think this performance has proved beyond reasonable cavil the right season for attempting to climb Mount Everest. Many people have sincerely believed that we were making a mistake in not attempting the mountain during the monsoon or, at any rate, just after it. I think the party's experiences this year have put that out of court. Secondly, the mountaineering judgment of Mallory in 1921 has been fully vindicated. It has been put beyond reasonable doubt that it is not the slightest use attempting the great north-west *arête*, which to one or two mountaineers has seemed rather attractive. That was seen at close quarters, and certainly that route will not do. Thirdly, we are pretty certain now, as I think

we were practically certain in 1933 also, that the proper route of ascent is that traverse which Brigadier Norton discovered with Somervell in 1924.

Fourthly, and most important, the monsoon snow conditions above 23,000 feet have been found to be difficult and dangerous; but more than that, the conditions on the North Col itself have been very thoroughly explored. Nothing but the most superb mountaineering judgment and skill would have got that party down off the North Col in the way it was done, and we must all endorse Mr. Shipton's judgment in coming straight down after that huge avalanche had fallen. None but mountaineers can understand. You saw that long line across the snow face of the North Col; that probably represented an avalanche of many hundred thousand tons of ice and snow, and it swept right across the route of ascent. Mr. Skipton was absolutely right to have nothing to do with the North Col after such a happening as that. So we must try to get up the mountain next year between, shall we say May 15 and, in more or less normal conditions, June 7. This year of course was an exceptionally favourable year in some ways, possibly the period during which the mountain might have been climbed may have been a little longer, say to June 14. You will remember that Mr. Shipton told us the monsoon did not break until about June 26, but probably the snow conditions were getting steadily worse by that time and a little before.

Fifthly, there is the fact that this party has subjected itself to that intensely exacting ordeal of acclimatization. I believe it is a fact that no test is known to medicine by which it can be proved how a man will react to very high altitude conditions. The party that was sent out this year had to undergo that test and, most unhappily, all did not pass it. They were all first-rate men, but it was the only thing to be done, and we can at least say that as a result of this test the nucleus of next year's party consists of men who have been thoroughly tried out and are known to be able to climb at those altitudes. That gives us a very much better chance of success in 1936.

In conclusion, may I congratulate not only Mr. Shipton on his extraordinarily fine leadership and judgment but also all the members of his party. I think I am right in saying that only two of the others have been in the Himalayas previously, but all climbed like veterans. I must not forget the fine performance put up by Mr. Spender who, I believe I am right in saying, had not done much climbing before he went with the party. How he got to some of his stations and did that valuable work for us in examining the north face of the mountain I do not know. Certainly he will train to be a good mountaineer if he is interested.

Finally may I say for myself that it is with a very deep sense of privilege and of responsibility that I am going to do my very utmost in 1936 to place these splendid climbers in an attacking position.

The PRESIDENT: We have Mr. Spender and Mr. Kempson with us. I am going to ask them to come up in turn. Mr. Spender, as you have heard, was the scientific element in the expedition and did very valuable work on the topography of the untrodden mountain region which the party were exploring.

Mr. MICHAEL SPENDER: I think the best contribution I can make to this evening's discussion is to say something as shortly as I possibly can about weather in general and Mount Everest weather in particular: it helps one to understand what happened to us and it may help others to understand what happens to next year's party.

As you all know, the typical feature of the weather which is met by the party which goes out before the monsoon is a frightful north-west wind, a wind of very great persistence and very cold. This year's party went out later in the year, at a time when the north-west wind would be weaker. It went out at the same time as Colonel Howard-Bury's party went out in 1921, and we could look

to them for an account of the kind of weather we might meet. So we borrowed the Secretary's copy of the account and read about their kind of weather and, Mr. President, we were depressed because they had a dreadful time in 1921; a time of perpetual cloudiness and frequent snowfall. We thought it might be difficult to take photographs under such conditions and that even the mountain climbers might lose their enthusiasm. So when we finally got to Rongbuk and the sun shone and the snow peaks gleamed we were very gratified.

As the season went on there was a worsening and unfortunately the day Shipton was on the North Col, July 15, was a very bad day indeed. By August 15 the worst of it was over. But even when it was at its worst the weather did not give us bad days in succession. There would be one bad day and then we were able to get on with the job the next day. It was not as in the Alps, where bad days come in such long periods as to make one restless. Those single bad days were welcome to us as periods of rest.

The principal point is that the north-west wind is the dominant factor. You must think of the monsoon as a great mass of warm air trying to trespass on the rightful stream of air for those parts. This has actually a very curious effect; for when you get the bad weather in the monsoon period it appears to come from the north and our joke was to call it the Gobi Desert monsoon. The real monsoon splits round the land mass of India into two branches, one of which comes from the Arabian Sea direction and the other makes a sort of flanking attack along the east coast. The first, the Arabian Sea monsoon, hardly ever gets to Mount Everest: it is the second wind that really brings the bad weather.

When the monsoon first comes up towards India the layer of warm air is only a few thousand feet thick, and it has no chance of reaching the summit of the Himalayas. But when you have a front of warm air advancing against this north-west stream of cold air, all sorts of disturbances are set up which develop into the storms which wander up and down and to and fro till they strike the Himalayas. When the first of these disturbances gets to Mount Everest there is some cloud and snowfall, and the expedition telegraphs back "The monsoon has broken." Well, that is just as you like to take it because the real mass of warm air has not yet reached Everest. That will come later on. Until the warm air gets to Everest there may be longish periods of fine weather, although there is always the risk of other circumstances coming in.

We got to Rongbuk just at such a fine period. We left it on July 6 in the most beautiful weather, when Mount Everest and all the other high peaks were glittering with new snow and there seemed to be no wind or cloud. But as we went on, and even until the beginning of August, we only got the warm air in fits and starts. From August 9 for a few days we had stormy weather, and it was very difficult to go on with my sort of work. That was the period when Mr. Shipton and Mr. Bryant were climbing together, and they had an uncomfortable night and very bad snow conditions. A few days later, when Shipton was at 23,000 feet on the North Peak, there were only 3° or 4° of frost at night.

The reason things were like this in the summer was because the north-west wind held its own more effectively than it generally does. The Bengal Bay monsoon actually was blown sideways by the north-west wind. Those of you who have had reports from India are already aware that Calcutta had only half its former rainfall and that Lower Bengal in general was very short of rain. On the other hand, Assam, Upper Burma, and Sikkim had too much, as we saw when we came back to Sikkim: roads had been washed away, bridges were down, and so on. Very probably Tibet had a good supply of rain, and we came in for the benefit of that because as we walked home we walked through good crops which the headmen were kind enough to credit in part to us.

On the whole, we really had finer weather than we should have had, and the little bit of bad weather we had in August was due to a disturbance skirting the foothills of the Himalayas and drawing up the warm air into the mountains; but as soon as that was past the north-west wind came in again and you could see it blowing over the top of the warm monsoon air. As August came to an end we watched the north-west wind gradually deepening and gradually pushing before it the warm summer air and taking the clouds away from the regions visited by the monsoon

Mr. E. G. H. KEMPSON: Acclimatization, I am afraid, is as necessary in speaking in public as it is in mountaineering, so I shall not detain you for more than a minute or two. There is one thing Mr. Shipton told you that I should like to underline, and that is the remarkable change in conditions that appears as you rise from the 21,000-foot level to the 23,000-foot level and above. On the occasion when Dr. Warren and I were climbing Kharta Changri we had a delightful camp on the glacier at 21,000 feet; it was a beautiful crisp night, with 30° of frost and actually the coldest night we had during the usually temperate monsoon weather. When we started up our peak it was perfect alpine weather. We got on to our col just making nicks with our feet in the ice, but as we rose to about 22,000 feet conditions got progressively worse. First we found crust such as you sometimes, unfortunately, get in spring ski-ing; then this degenerated into the powder snow of which you have been hearing. The worst characteristic of that powder snow was the fact that the steeper it got the deeper it got: progress was very slow. We actually took four hours getting to the top of our peak whereas it took us only thirty-five minutes to come down. This gives a measure of the work in the ascent.

I cannot close without saying two things: first, and you all know it, the porters that we had were simply superb. Some of us started by being just a little ashamed of not carrying enormous loads when every one round seemed to be carrying 60 and 80 lb., but you get over that after a bit. The porters were really quite first rate, and my porter who came back to Darjeeling through Tibet with me was one of the best. Secondly, and this I also need scarcely say, I cannot tell you what an excellent leader we had in Shipton. He left out one point about himself. He suggested that he always ate a great deal. Well, perhaps he did when he was in the valleys but he was an astonishing person up high. He seemed to subsist on nothing, though he himself would dispute that fact and blame all of us for eating nothing. But that is the only fault I can find in him. It is sufficient to say that our party under his leadership had not a single quarrel.

The PRESIDENT: Colonel Howard-Bury who led the original reconnaissance expedition is here. We shall be very disappointed if he will not give us a few words. It must have been of great interest to him to compare his own experience with what he has heard to-night.

Colonel HOWARD-BURY: I came here this evening to try to recall some of the old places that I had seen about fifteen years ago, but I should really like to congratulate Mr. Shipton on those wonderful photographs he has shown. He mentioned the enormous consumption of eggs on the way up. I should like to ask whether they were chickens' eggs, for on our way up we were presented with wild geese eggs, and we could not possibly have competed with the 1935 party's consumption. Further, I would like to ask him whether he was also given eggs on the way down. The children found out that we liked eggs very much and kept the eggs all the summer, offering us them in the autumn, and being surprised that we would not have anything to do with them as food!

What has interested me enormously is that Mr. Shipton has taken a totally different route from other expeditions. We only saw the map for a short time,

but the way he went to Mount Everest was completely new. All along, he has been through a new line of country, and though he has told us very little about the geographical work that has been done, I am sure that a great deal of most useful geographical work has been achieved in the reconnaissance that he has done this year. For whereas in 1921 we went along, I might say, the valleys, he seems to have been going along the tops of the peaks the whole time. But he has borne out very much what we found out round Mount Everest about climate. We were there throughout the whole summer and until comparatively late in the autumn. We too found that there was that heavy snowfall and that the mountain looks completely different in the autumn from what it does in the spring, when it looks quite black. Then there is that perpetual terrible wind that begins after the monsoon and blows with increasing force the whole time. Clouds of snow blown off from the summit of the mountain render a climb after the monsoon quite impossible. I am glad it has been again established that at that time it is no use attempting to climb the mountain.

I congratulate Mr. Shipton most heartily on his expedition, on the geographical work that he has done, and on the most excellent photographs that he has taken.

Dr. T. LONGSTAFF: I am glad to have the opportunity of paying my compliments to Mr. Shipton. I do not think he has made it evident that during the expedition last summer about as many peaks of over 20,000 feet were climbed in the Himalaya as have been climbed since the days of Adam, so far as I remember the list.

I would also like to say that I am as firmly convinced as ever that his system of sending people up to 20,000 feet and over as often as possible and bringing them down again is the best form of acclimatization that there is; that it is a very much better method of acclimatization than keeping people permanently at a high altitude, and I have no doubt the climbers who were with Shipton will show that that form of acclimatization remains with them permanently. The oftener you go to 20,000 feet the better able are you to go again, but if you stay for a great length of time at a high altitude your general condition degenerates.

I must also congratulate Mr. Shipton on the extremely economical way in which he conducted the expedition. He has always been a shining example in that respect, yet although the expedition's work was executed with great financial economy you will notice that he did not grudge his party 140 eggs a day! If we can manage to collect a team of mountaineers of the technical capacity of Mr. Shipton there is no doubt that Mount Everest will be climbed, given the luck of the weather.

The PRESIDENT: It may interest you before we close this meeting if I let you know the names of those who have been invited and have accepted the invitation to be members of the 1936 Expedition. Mr. Hugh Ruttledge will lead, as you know, and I am very glad to say Mr. Smith Windham will take charge of the wireless; Mr. F. S. Smith, whose climbing reputation you know; Mr. Shipton; Mr. Wyn Harris, who did so well in 1933, coming from Kenya again; Mr. Kempson, whom you have just heard and who well won his spurs on the recent reconnaissance; Dr. Warren, who was with Mr. Shipton; Mr. Wigram and Lieutenant J. M. Gavin, R.E.; Major Morris, a retired officer of the 3rd Gurkhas, who has been in Nepal and is on his way to Darjeeling, and whose business it is to collect the Sherpa porters and run the transport. Finally Dr. Noel Humphreys, whom all of you know by name and who has recently returned from an expedition which he led to Greenland with Edward Shackleton. That makes eleven; there is one more place to be filled.

Now to say a word of thanks to Mr. Shipton. It is an astonishing accomplishment that they should have been able to climb successively twenty-six fine

peaks all over 20,000 feet. This, as Dr. Longstaff put it, is more than the separate climbs that we know of in the Himalayas since the days of Adam. You will agree, I am sure, from what you have heard that it was entirely worth while sending out this reconnaissance. We have learned a great deal from it. Unfortunately two men who were believed to be candidates for the 1936 Expedition were found to acclimatize badly and had to be dropped out. If they had not been tried on this occasion they would have gone on the main expedition and failed at the last trial. Mr. Shipton himself has come back extraordinarily fit and well: all the better for his summer experience, and fit to go again and to attack the summit we hope. I ask you to join me in thanking Mr. Shipton and his companions very heartily for addressing us and in congratulating them on their splendid performance.

TWO MONTHS IN THE HADHRAMAUT: *A paper read at the Evening Meeting of the Society on 16 December 1935, by*

FREYA STARK

MY journey in the Hadhramaut was not a voyage of discovery, for this country has been visited since 1843 by seven explorers with or without companions, and in recent years by British Air Force and political representatives as well. The country through which I travelled has been mapped, excellently though necessarily not completely, by Herr von Wissmann; and an authoritative book on it is, I think and hope, being written by Mr. and Mrs. Ingrams who were there just before me.

I followed in their footsteps from Mukalla, about 300 miles east of Aden on the coast of the Indian Ocean, northward 100 miles or so inland to Tarim and Shibam, where I hoped to turn from their route into new country. As this first part of the journey had been observed by far more competent eyes than mine, I travelled so to say as a tourist. I reserved my compass and the rangefinder, which your Society kindly lent me, for the later stages, which illness unfortunately prevented me from following. The rangefinder would in any case not have been as useful as I had hoped owing to the fact that these naked cliff landscapes during all the hot hours of the day refuse to stand still to be looked at: they flicker about in an inaccurate way. David, I am sure, was referring to them when he spoke of hills that skipped like rams: the Badawin on the other hand did not take my instrument for a machine gun, as I had feared they might, but accepted it philosophically as a rather difficult sort of telescope.

The place I was trying to reach was Shabwa—the ancient Sabota—mentioned by Pliny as a city with sixty temples, capital of the land of frankincense. The country of the frankincense, which is now more or less confined to the Gara mountains round Dhufar, came very much farther west in ancient times. In the days before Christianity, when precious odours were burnt on every altar and at every funeral, the incense trade was incredibly more valuable than now; and all the frankincense in the world comes from the coastal strips of South-East Africa and South Arabia. It so happened that the Arabian coast was also the nearest point of land on the way from India to the Mediterranean, so that the southern Arabian towns not only had great natural riches in the clefts of their own hills but were also the dumping ground for almost the whole of the Indian trade with the West before the silk route was opened through central Asia. They were the starting point for that great caravan road which passed through the deserts of Arabia and followed what is now the pilgrim way from Mecca northwards, and brought the riches of the East to Egypt and Palestine, Assyria and Rome.

In the north, where it forked to Egypt and Syria, this caravan route created the Nabatean empire and the magnificence of Petra. In the south it created at least four great Arabian empires from 1400 B.C. or earlier down to the first centuries of Christianity. What happened before that, what people first handled this Arabian trade, where they came from or how they came is quite unknown. The last of their capitals, Tzafar, is easy to reach in Yemen. Two

others, Ma'in and Marib, were visited by Joseph Halévy, who went to both, and by Thomas Arnaud and Edouard Glaser who reached Marib only; but they were all in disguise and in too much danger to linger long. Tamna' and Shabwa have not been investigated, though the outskirts of Shabwa were reached this year. No excavation has been done in any part of the country except for the uncovering of a temple in the north of Yemen by MM. Rathjens and von Wissmann, far from the old capitals. The reason is that the approach from Yemen, the easy way, has been persistently forbidden by the Imam. The primitive history here is therefore an almost absolute blank. Flint and obsidian knives, which both the Ingrams and I found in great quantities at Mashad in Hadhramaut, suggest that the later ruins there had Stone Age traditions at all events behind them. The earliest inscriptions found show lettering so perfect that centuries of civilization must have gone to produce it. They also show the use of an alphabet as we understand it, our own alphabet to all intents and purposes, and the origin of this remarkable invention is probably to be traced through South Arabia. It is a country in which the archaeologist still has all before him.

The Hadhramaut, the Hazarmaveth of Genesis and Atramotitae of Pliny, was the last but one of the great empires before the advent of the Romans. The Romans were a prudent people: they made friends with the Abyssinians, and by so doing conquered without bloodshed the sea-route to India and the Indian trade. The Arabs, to whom this trade was as vital as it is to our own empire to-day, were ruined by the Roman policy. The Abyssinians—originally a colony from South Arabia—for some time ruled both shores of the Red Sea. From that day the south of Arabia has uninterruptedly declined. Its great port of Cana is a desert of sand dunes, not very safe to wander in, and extremely unhealthy: the high road up to Shabwa has never been explored in its length nor exactly located: only the inland cities, sunk between the cliffs of their wadis and surrounded by desert, keep unconsciously in their high buildings and in some of the trinkets of their women, the splendid traditions of their past.

Two years ago Colonel Boscawen tried to enter Shabwa, but the inhabitants shot at him from the walls and killed one of his men. This year everything was particularly peaceful owing to the treaty recently concluded between the King of Arabia and the Imam of Yemen. I thought, quite correctly as it turned out, that one could easily get to Shabwa from the Hadhramaut.

The first problem was to find introductions into the Hadhramaut itself. The people there have an old custom by which they provide a bodyguard of troops to the Nizam of Hyderabad: I thought that he would probably be able to make things easy for me; Lord Halifax very kindly wrote to the minister, Sir Akbar Hydari; Mr. Pickthall in Hyderabad spoke to the Sultan of Mukalla, who spends most of his time there; and the Sultan sent me a number of letters to his own governors and friends from Mukalla to Tarim. I should like to say how grateful I am for all this kindness, which I was fortunate in meeting everywhere on my way.

In Aden it was the same. Aden has been given a bad name by former travellers, but both the Residency and the Royal Air Force wiped out this painful tradition completely as far as I was concerned. M. Besse, who has a

From the western gate of Mukalla

From the hill of Mukalla. The track to the

From the hill of Mukalla. The track to the

large business and Arab agents in the interior, allowed me to make use of them, gave me further introductions, and sent me in one of his little steamers along the coast.

These little cargo steamers go at irregular intervals of a few weeks and anchor off any town where there is merchandise to leave or collect: the ports are not deep enough for them to go close in. Sometimes one of the Dutch liners will stop and take passengers from Mukalla, for there is much emigration from the Hadhramaut to the Dutch Indies or Malay. The cargo is unloaded into boats pointed at each end so as to ride in over surf, and with planks sewn together without the use of nails, just as Marco Polo in the thirteenth and Ibn Batuta in the fourteenth century describe them: at that time they used to take horses to India, on top of the cargo which was covered with raw hides, and Ibn Batuta mentions that he made the voyage from Calicut to Dhufar in twenty-eight days.

I landed in Mukalla on January 15 and spent five days there very kindly entertained in the Sultan's guest house that looks out over the city wall on to an open space where the Badawin camp in the circles of their couching camels. Beyond it is the romantic, solitary coast, with yellow sand and volcanic mountains, range behind range on the edge of the sea. The sea here is far more inhabited than the land: millions of small fish live in it and feed the seagulls that stand in one solid ribbon for many miles along the damp strip at the edge of the waves. The fish are dried and used as fodder for camels and as a fertilizer on tobacco plantations. There is also a trade in dried shark fins which are sent to China; and the shark itself is eaten after it has rotted and dried in the sun. Every caravan bound for the interior carries a supply of this food buried under flies, and taints with its smell the clean air of the hills. As I took no servant and my Badawin cooked for me, they used to put lumps of it into my rice, in spite of my efforts to discourage them: I found as a matter of fact that it was better to eat it than to smell it. The food in general was not so good as in Persia or Syria. Rice with sesame oil and red peppers, and a drink made with the husk of coffee berries and ginger boiled together, were our chief diet on the road.

The people at Mukalla were worried over the fact that I had no servant and wanted no escort. I was the first woman to travel alone in the country, so they had no precedent to deal with me. I knew that one is much better by oneself with the Badawin than with a servant who nearly always quarrels; but the Governor kindly and firmly insisted on giving me a black slave soldier from the Sultan's bodyguard. He was very useful for washing up and making my bed, but his more warlike qualities were never needed, for every one we met was friendly.

On the fifth day at Mukalla three little Badawin took over my luggage, tied it up in sacking, and slung it over four small donkeys, of which the strongest and handsomest was to carry me as well. The Badawin belonged to the Murshidi tribe of Kor Saiban, small and dark with long hair, often tied in a bun on the nape of their neck. They wear nothing but a cotton loincloth and a silver bracelet over the right elbow: sometimes a cornelian round their neck on a string, to stop the bleeding from a wound, they say. They stain themselves with indigo to keep themselves warm, and if they are well off they have

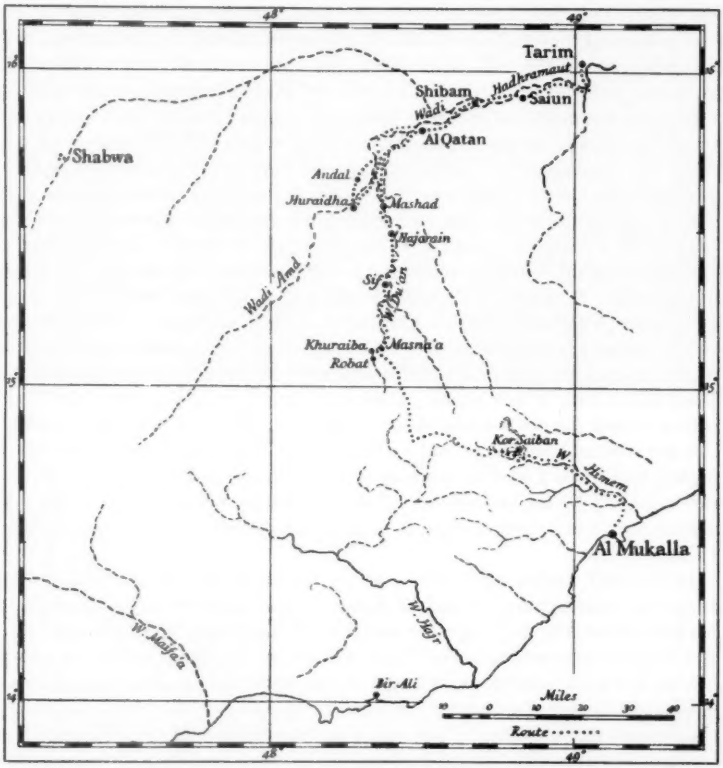
a finely wrought curved silver dagger sticking at their waist. They are very poor, far more so than the Arabs of the north. They were pleasant companions to me and we never had a word of disagreement, but they dislike Europeans as a rule, they told me, "because they are proud and order us to ride behind them, and sit in the evenings round fires of their own." I had no fire, so I was glad to sit with them when we camped and to drink their ginger coffee; and this must have pleased them, for they said continually that they looked upon me as a guest and not as a Christian.

For two and a half days we rode up towards the high plateau of the Jol by the wadi Himem, one of the long and narrow gorges of this country, eaten out by water and wind into precipitous sides, hollowed like organ columns or worn into fluted surfaces like walls. Many trees grow here, and the higher defiles must be lovely in summer when there is water among the boulders. In the side valleys the frankincense still grows, they told me, and there is enough for local use though the export has ceased—more from the want of a demand than from any difficulty in the supply, it seems.

As we climbed up out of the valleys onto the waterless high expanse of the Jol, the vegetation changed: scrubby little bushes alone grew here, and the twisted feathery Qadah acacia. We reached the watershed, the limestone fortress cliffs of Kor Saiban, the highest massif of the plateau, about 8700 feet above the sea, and then walked for two days along that uplifted level, with the small ends of wadis dropping away from us as suddenly as oubliettes on either hand. The only water here is gathered from rain into pits dug in the rocky floor beside the square shelters built at intervals for wayfarers. The wayfarer is provided for all over South Arabia: white domes with troughs of water, endowed by pious Moslems and filled daily, scatter the valley roads; the sight of these small white buildings left by the dead gives a friendly feeling of companionship in the lonely brown land.

There is a human feeling too about the track that crosses the Jol, for it has been smoothed out and made shiny on the naked rock merely by the passing of men and animals through centuries of time. The Badawin, wearing cheap sandals against the heat of its rocks, trot up and down across it, for it is their chief means of livelihood, and one can understand that they are not enthusiastic about a motor road to come and spoil it. Each tribe conveys people through its own territory and no farther: this is a great nuisance, as it means changing one's company just as they have got accustomed to one's ways. My men would willingly have come on with me under the protection of the black slave, but they would be set upon, they said, if they returned alone; and into the far lands of Shabwa they could not venture. The Mukalla government is strong just now, and one can go peacefully from the coast to Tarim; but there was a war in wadi el-Aissar on our right, and in wadi 'Amd on our left. It does not affect the Mukalla government, which goes on the principle that prevention is better than cure and keeps two members of most of the tribes in prison as hostages for the good behaviour of the rest. I went to visit them there and was taken to look down on about thirty of them in a black dank hole with a number of children among them; their food is thrust in to them, and they are left in a very unhygienic condition for six days of the week and all taken to bathe in the sea on Friday. Every month or two they can exchange with others of their

tribe: but I was not told who it is that decides on the exchange. My Badawin told me that their own loyalty was so assured that no hostages were required from them. One of them had just come from the little war, and celebrated it in poems as we went along: and they danced or sang war songs with their daggers held upwards to the level of their eyes; when their donkeys, who knew all about it, began to trot of their own accord, and settled into a walk again



when the tune changed or when one of the men, pulling his reed pipe out of his sash, made long wailful music like the wind.

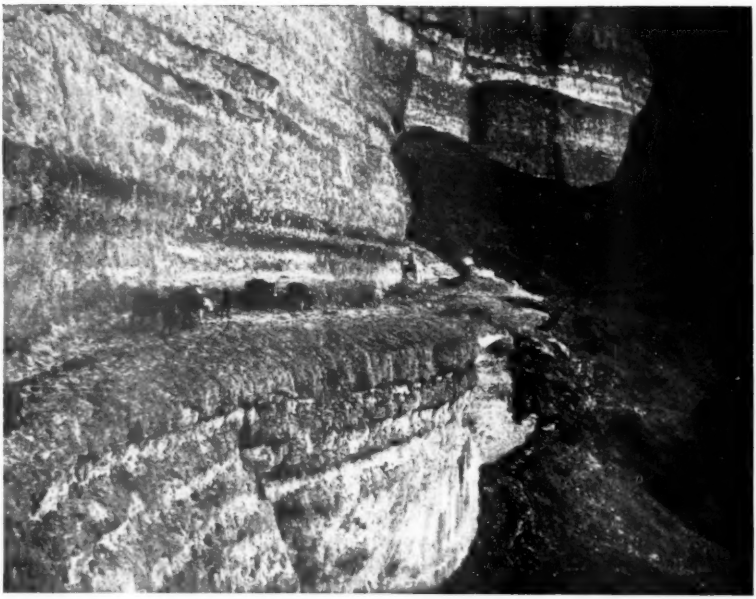
On the seventh day from Mukalla we reached the lip of wadi Du'an and looked suddenly over this mighty view. To come upon it after a week of empty flat horizons is alone worth many months' journey. It took us fifty minutes to descend the Aqaba or cliff path smoothed over rough stones by generations of slipping donkeys and camels. The camel is far more difficult to manage in these places, and slower, and therefore more expensive relatively to hire than a donkey. We came to tilled fields in the level bottom, flooded in autumn, and to palm glades and shadow, until we reached the governor's fortress of

Masna'a and his Badawin bodyguard shot off their rifles from the walls to welcome our arrival.

Everything had been going so very well with me up to this time that I suppose some misfortune was due to happen. "Providence is always kind, but often a little thoughtless." I had no sooner been settled in the harem of the governor's castle than I developed measles: an epidemic was sweeping the country at the time, so that it was almost impossible to avoid it. The two governors and their families were very kind and did all they could for me and restrained their ladies who offered to treat me as they do themselves, with a red-hot iron at the back of the neck. My hostess was the widow of the old governor and had been his tenth wife—for the Hadhramaut is particularly modern in the matter of divorce. She used to spend the day in my room and bring her friends, so that I rarely had less than ten or fifteen ladies round me. They were handsome, in a different way from ours, for they varnish their faces a bright yellow with a mixture of oil, turmeric, and wax: sometimes the eyebrows and nostrils are scarlet, and often a thin green line is painted down the nose and in a design on cheek or brow: the lips have small blue tattoo marks, and they weigh down their ears with seven or eight ear-rings all at once. These marks on the cheek and forehead are I believe very old, for I found them carved on a Sabaean alabaster statue. The Du'an dress in the house is black, with a square breast-plate of embroidery or silver. Their hair is done in innumerable plaits, once a fortnight or so, with a fringe on the forehead shining with oil. They dance with it, not moving their feet, but flinging the top of the body round so that the plaits whirl about in patterns. Many of them are beautiful slender women, with large and brilliant eyes. But I lay delirious for three nights, and when I used to wake up in the morning and see such an apparition standing by my bedside in full dress with my breakfast in her hand, it always took me a few seconds to pull myself together and wonder where I was.

In the wadi Du'an one comes into the region of old ruins, which do not appear to exist between it and Mukalla. There seems to be no mention of Mukalla before the tenth century and the old main route was well west of it. But Du'an is supposed to be the Toani of Pliny; M. van den Meulen saw ruined houses in a wadi near by, and I heard of a number of such sites but was too ill to go and see even the cisterns reported in the cliff just above us. I did see a small cabin like a swallow's nest stuck to the overhang of the cliff in a place completely inaccessible: it had a rectangular window, and the governor showed it me through my telescope. It would be impossible to reach except by a rope let down from above.

I was not fit to do anything in Du'an after my first day, which I spent in visiting the towns of Khuraiba and Robat. The big cities in the wadi Hadhramaut itself are more splendid in their architecture, but it is in these side valleys that the old-fashioned life of the country can best be seen with, as yet, no foreign influence. The principle is the same. The towns cling to the more defensive slopes of sandstone at the wadi side, below its limestone cliffs. Every house is built primarily for defence. No stone is used except a layer or two in the foundations, embedded in mud. On this the walls rise, immensely thick, and sloping slightly towards the top, storey upon storey; piled upon



Way down into wadi Du'an

Wadi Du'an

Hajarain

rocks at the valley side, they hang over the paths and fields below, and overlook them from their windows. Nothing but mud and straw is used for these great walls: they are mixed into flat bricks about 18 inches across and 3 inches thick, hardened for six days in the sun, and then laid down in liquid mud like mortar: even the heaviest rain, they told me, does not penetrate more than an inch or so into their thickness, and some of the oldest buildings are said to have stood about five hundred years. These older buildings usually have four round towers at the corners. Everything in them is arranged for comfortable shooting and for defence: a hole for a rifle barrel is made beside many windows, and the wooden carved lattices—for there is no glass—are protected by shutters thick enough to keep out bullets. The latch of the front door is pulled up by a chain let down from the upper storeys through holes in the floor, from a safe distance, and there are no windows at all on the ground floor: then there is usually a row of little shot-holes, and then the windows of the living rooms above.

The living rooms are very beautiful. Their walls are wainscoted with old dark carving studded with knobs of tinned iron, and the ceiling, made of a herring-bone pattern of palm wood, is supported on carved pillars. The capitals of the pillars are not round, but flat on two sides on the same principle as those of ancient Persepolis and modern Mazanderan. The mud walls are often worked indoors to a smooth shiny surface with whitewash, almost like distemper, and the floors and the steps of the stairs, which are always pleasantly shallow, are waved into a ribbed pattern like sand. The doors are also worked in the hard wood of the country called *'ilb* or *nebk*, and besides their decorated surface often have seven or eight carved bands above the lintel. Their keys, made of a series of wooden pegs that fit into sockets, must be a great discouragement to burglars.

The interior of the house is a labyrinth of stairs and passages ending in two front doors, one for the men and often a small and unimportant one for the women. Each wife has an apartment of her own with its own bathroom, which consists of a floor sloping out to an open gutter and a drainshaft leading out into the street. This seems to worry nobody. Diseases, the ladies all told me, and measles in particular, come from things like scented soap and not from drains. Peasant women now and then would snatch their babies away from me for fear I might be scented, and the most prudent mothers sealed up their children's noses with little plugs.

On my eleventh day in Du'an I had no more fever but seemed to be threatened with pneumonia. I decided to push on into the wadi Hadhramaut itself where I could be met by a car and where a chemist if not a doctor existed. The cars can run to and fro only in the main wadi after being carried up to it in bits on camels across the Jol. A messenger was sent, and news came that a motor had been pushed down to meet me as far south as Hajarain, a day and a half's ride away.

A little beyond Masna'a the valley grows wider, with a more desert look, and *'ilb* or *nebk* trees (*zyziphus spina Christi*) take the place of palms. They are not considered as valuable as the palm, for a single stem of which people here give as much as £35, but they have many uses: they provide wood for carving, leaves for fodder, flowers to feed the bees which live in earthenware

pipes in the houses, and berries for the Badawin shepherds who, they say, carry nothing else with them if they go raiding in the north.

We slept at the house of a hospitable merchant, and at lunch time on the second day, through stretches made barren by constant little wars, reached Sif, a place of trouble for various travellers. I found the people more turbulent than in Du'an, but friendly enough when I had taken off my hat two or three times to show them what I looked like. We were coming into more lawless country, where a strip of no man's land runs a wedge into the territory of Mukalla between Hajarain and Ajlania; and I was given three Yafa'i as escort: these are tribal mercenaries, and together with the slave bodyguard form the army of Mukalla. They are tall, gay, and reckless, and a different race from the small southern aborigine: the Mukalla Sultans belong by descent to their tribe, and came down with them from the western hills when they settled in the Hadhramaut.

It was dark and late before we reached Hajarain and climbed up under its walls by moonlight with the gutters above us and the sewage below and a solitary lamp behind the closed gate of the town. Next day a car took me to Mashad, where the greatest ancient ruin-fields of the valley have already been described by Von Wissmann. He missed however the important fact that the site is covered with small blades and flakes of flint and obsidian, some showing usage and all resembling, according to Miss Caton Thompson who kindly looked at them for me, the Stone Age finds in Kenya. The day after we passed by the mouth of the wadi 'Amd and came into the wadi Hadhramaut itself, the longest wadi but one in Arabia.

All these wadi mouths are wide, and in the heat of the morning the distant cliffs disappear in the haze of the sky; it felt like a prison door opening. These endless buttresses, one behind the other and all exactly alike, with never the sight of an open horizon, sometimes became like a nightmare. I once asked the Du'an ladies if none of them had ever walked to the top (only an hour's climb) to look over the Jol that shut them in: not one of them had ever done so. The Jol, the ocean, the lands beyond it to which their husbands go, and leave them for ten or twenty years and come back with other families at last, were all alike to them. The women refuse to leave their valleys: they are content for ever and ever to see nothing but the precipice walls.

In the wadi Hadhramaut the women's dress alters. They wear a heavily embroidered gown, short to the knees in front and trailing behind with many-coloured bands descending from shoulder to hem. And when they go out, they cover it all with an overdress of the same shape but plain, blue in Shibam and green or yellow in Tarim, with white leggings if they happen to belong to a Sayyid family. They veil their faces and wear conical hats. The legend says that a certain Abu Zaid who conquered the Hadhramaut in vengeance for his brother's death, imposed on the women to blacken their faces and wear these black short gowns in sign of humiliation, and so the fashion came.

There are three great cities in the wadi Hadhramaut, Shibam, Saiun, and Tarim, and other lesser ones; and now that there is a growing security, and the wadi's two rival sultans, the Qe'eti of Mukalla in Shibam and the Kathiri in Saiun and Tarim, have made peace, the villages are gradually creeping down from their defensive positions on the slopes, and isolated houses in palm

groves, decorated with whitewash, make the southern side of the wadi look almost like a garden city of the east.

It is a little world of its own shut in by cliffs. The Jol on its south leads to the Indian Ocean: that on the north to the sands of the Empty Quarter; its headwaters have not yet been visited and its estuary was reached down the wadi Musaila for the first time this year by Mr. and Mrs. Ingrams. But inside these boundaries there are, I am told, eighty motor cars, two taxis, and any number of bicycles; a private cinema, electric light, and a telephone which works inside the town but cannot go beyond because the Badawin cut the wires. There will be even more of all this when the el-Kaf family, my very kind hosts in Saiun and Tarim, succeed in finishing the motor road which they hope will connect them with the sea: they are rich and public-spirited people, owners of property and modern hotels in Singapore, and they carry on their business by means of Badawin runners across the Jol, and spend their old age in their native valley trying to make peace out of its difficult politics; paying blackmail to the Badawin in the shape of presents, keeping some slight discipline in their rebellious and troublesome army of slaves, and making constant and expensive truces between all the little towns that go to war with each other.

I spent a fortnight wandering about the valley, mostly in the delightful city of Saiun, in the summer house of Sultan Ali, of whom I grew very fond, as well as of Sayyid Abu Bekr el Kaf. Saiun has more open spaces, cornfields and gardens, than Tarim which the new fashions in building are beginning to spoil, or than Shibam, whose five hundred houses are huddled like a single fortress on a rise in the middle of the valley. But in all these cities the ancient splendour of the architecture can be seen, rising to many storeys, with a delicate lacework-like stucco, but all carved in mud, to decorate minarets and terraces. One can see by comparing it with the stelae of Aksum, once a colony of the South Arabian empires, how the style of building has come down unchanged. I did my best to impress on all my friends there how much more beautiful I thought their skyscrapers than our own, and I refused to be enthusiastic over Sayyid Abu Bekr's introduction of concrete for his newhouse and garden.

Saiun is the most peaceful of the cities, open neither on the east nor west, but even here a Badawin escort is necessary to cross the country of the 'Awamir tribe on the way to Tarim. Among the cities between Saiun and Shibam peace has just been made and they have been induced to abandon the digging of trenches against each other's walls and to devote themselves to the growing of palms. But west of Shibam there is all the uncertainty of life in the Middle Ages. A series of truces, made for the Sultan of Mukalla's visit last autumn, was still continuing when I was there; but they were coming to an end in two months' time, and a small race for armaments was going on just as keenly as if we had been in Europe. Trenches were being run from town to town to cover their mutual attacks and to allow the peasants to reach their fields. But the warlike districts are poor in cultivation, and I feel sure that insecurity is the chief cause of the decline of agriculture and the encroachment of desert in all this country. Where the wadis 'Amd and Hadhramaut join, the whole region had been turned into a wilderness of sand dunes, because the Badawin

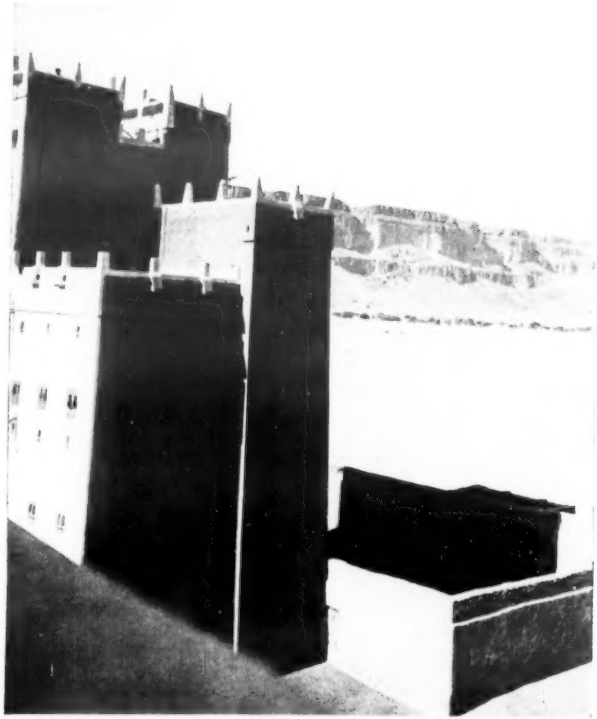
came by night and poured paraffin on the palm roots. They had allied themselves with a small town which carries on an hereditary war against one family whose solitary castle now stands in a landscape of sand. I went to call there and was kindly welcomed by people who carry on a flourishing business in Java: half the family live out there in the modern world while the other half take it in turns to carry on their ancestral war at home. They took me up to their highest parapet where they have loopholes from which, they said: "We can shoot at the town with a mauser": they keep four pairs of field-glasses to watch the enemies' movements, but they told me that as a matter of fact the fighting is done by night and commerce continues by day. I could not help feeling that they enjoyed their little war.

I went as far as Huraidha in the wadi 'Amd to look at the site of Andal, which is mentioned by the Islamic geographers as the first town one comes to in Hadhramaut. It had not yet been visited (since Von Wrede's travels in 'Amd seem definitely spurious) and I found that there is still a village there with the old name and 5 acres or so of debris with shards of Islamic glass and pottery, and three wells. The pottery includes two lustre shards of the ninth or tenth centuries, a green shard of the same period, one tiny fragment of Chinese blue and white not earlier than the fifteenth century, two painted shards which might be anything from Neolithic onwards, and a number of glass and blue glaze and rough fragments of large jars which might belong to any period from the second century A.D., but appear on the whole to centre round the ninth and tenth centuries. There is a resemblance with the finds of Sir Aurel Stein on the Maqrun coast, and the kilns there may have supplied a coastal trade which could penetrate as far as Andal. I owe these suggestions to the kindness of Mr. Hobson at the British Museum. I found no Sabaean objects here, but there is a very big Sabaean ruin-field south of Huraidha, mentioned by Van den Meulen, and there seems to be no doubt that the wadi 'Amd must have been the ancient high road towards the coast and probably was used into Islamic times. Imru'l Qais, the poet prince of Kinda, mentions it as a day's ride between Dammun and Andal; and I found this to be quite accurate, for I discovered Dammun close to Hajarain. It is rather interesting that the wadi 'Amd is coming into its own again as a trade route now that the tribes on the coast begin to find commerce more profitable than plunder, and, by charging lower transit dues than Mukalla, tempt the merchants to send their caravans this way.

All this country is in the jurisdiction of the Sayyids of the house of 'Attas, but they are very much under the Damocles' swords of the Badawin tribes of the Jol. The Sayyids are not armed and have to rely on moral force entirely: they find it very exhausting.

I have never been more charmingly welcomed anywhere than in Huraidha. As I was the first European woman to go there the Sayyids gave the children of the school a half-holiday, which made me very popular. They have a library here of 10,000 volumes, half of them in manuscript they told me, collected by their ancestors, and kept under a dome of the mosque which their uncle built; and there was a charming feeling of gentleness and real love of learning there in that constantly threatened little town, a very outpost of civilized life. In Huraidha too I found in common use the old Sabaean animal decoration round

A doorway in Saiun



Fortress house from whose parapet: "We can shoot at the town with a Mauser." (The enemy town is visible under the cliff)

the house tops, ibex-horns or others, such as I had already seen round the tomb of a *wali* in a poor little village by the Jol.

I made this short expedition to Andal to try my strength, for I had no idea that my heart had been poisoned, and I had Badawin now ready to take me on to Shabwa with one of the caravans that go there all the time for salt. There was no obstacle in the way and it is only an easy four days from Shibam. But I began to feel very ill, and the more so as in my ignorance I treated myself for malaria. I was also pitched out of the car while crossing the belt of sand dunes whose long yellow tongues run down the wadi Hadhramaut from the west. It is fine reddish sand, finer than any I have ever seen and soft to fall on; but I was shattered when we stopped for the night at Henin under the northern cliff. Two modern young men live here with electric light over their doorstep but so much at the mercy of the surrounding Badawin—a wild-looking lot of the Nahd tribe—that, as they told me, "we have to do whatever they like." They came in in troops, swaggering and almost naked, after dinner to listen to the radio, the only one in the Hadhramaut. The young men turned the switches about, to find London for me: and as it was Sunday evening the words of an English service fell suddenly through the darkness among the blue shoulders of the tribesmen. I think that I have never been made to feel so lonely or remote as by those words nor could one imagine a stranger contrast. I was just able to reach Shibam next day and collapsed there in the hospitable bungalow of the el-Arjam brothers, who, together with my friends in Saiun and Tarim, treated me with more devoted kindness than I can say.

I now wrote to Aden and asked that, if any R.A.F. planes happened to be coming to the Shibam landing ground, a doctor might be carried to tell me what was the matter. I think I must have died but for an Afghan chemist from Tarim who came and injected some medicine into my vein.

As I lay there for a fortnight a young German came into the country and passed on his way to Shabwa. He had been in the Hadhramaut before and had made himself unpopular by saying things about the people which were as a matter of fact untrue. News of his doings used to be brought me day by day with the pious wish that "If God wills the Badawin may kill him before he gets to Shabwa"; indeed there was a lot of feeling about the matter in all the wadi.

The Badawin however were as peaceful as lambs just then and there was nothing to prevent any one from travelling in the west. Owing to the peace, even the old caravan route to Nejran was reopened, a thing unheard of for a long time. The long caravans from Yemen with their tall Semitic men came walking down into our valley, one hundred animals or more at a time. The German went with one of the salt caravans: he reached the modern Shabwa, but apparently was turned out after three hours by the Badawin there; and the old site, a day's ride farther on, is still unvisited as far as I know.

On March 15 I heard a strange noise in the valley and saw four bomber planes filling the sky between the cliffs: no aeroplane ever looked quite so beautiful in my sight before. Dr. Haythorne Thwayte had been sent with them, and found me more ill than I had thought. The hot season was coming, it was too late to stay in the wadi and hope to recover: they strapped me into a stretcher and we reached Aden in five and a half hours next day. I should

like to express my gratitude for the kindness of every one concerned. And I should like to thank the Trustees of the Percy Sladen Memorial Fund, who helped me with a grant for this journey. In the whole course of it, so sadly incomplete, I must say that I met with nothing but goodness, both European and Arab; and can say for my part that, wandering much about the world, I find it to be full of very pleasant people.

DISCUSSION

Before the paper the PRESIDENT (Major-General Sir PERCY COX) said: Miss Freya Stark who will address us to-night is known to those who are Fellows of the Society because she received the Back Grant, one of the Society's Awards, two years ago. She was given that award in recognition of two very courageous and valuable solo journeys she made in Baghdad and in Persian Luristan. She has written a book which many of you must have read, 'The Valleys of the Assassins,' in which are also included two or three short journeys in Northern Persia in the region between Elburz Mountains and the Caspian Sea. In those journeys her object was to visit the habitations of the old "Assassins." You will remember that the word applied to this sect has no connection with the English word "assassin," but is a corruption of the Arabic word *Hashishin*, which means people who are addicted to smoking hashish, one of the hemp drugs. Miss Stark made two very interesting trips in that part of the world and her book is, in my opinion, a gem of eastern travel literature.

To-night Miss Stark is to address us on her experiences in the Hadhramaut, the region east of the Aden Protectorate in Southern Arabia, where there has been little travel until quite recently owing to the objection of the people to foreigners entering their country. A woman can do a great deal in such a country, but not every woman, and it must be very difficult for a woman travelling alone in those regions where civilization and savagery are strangely mixed. You can only achieve your object if you have the right equipment, and that Miss Stark has. She knows the language well and has that capacity for getting into touch with people she travels among. For that reason, as a thoroughly efficient lady traveller, her experiences are the more interesting and valuable.

Miss Stark then read the paper printed above, and a discussion followed.

The PRESIDENT: There are not many present who know the Hadhramaut, but we are fortunate in having Wing-Commander Cochrane and Squadron-Leader Rickards with us. The former led the air reconnaissance which he described to us some years ago: the latter showed us more recently an excellent film of his journey into the country to make the landing-ground for the R.A.F. at Shibam.

Wing-Commander COCHRANE: I feel somewhat diffident in following Miss Stark from whom you have heard an intimate description of the Hadhramaut, but I am heartened by the thought that after two months' stay there her experiences have been recounted in one hour. I think the whole time I had any connection with the Hadhramaut was about five hours and a quick calculation shows I have only to keep you for about 12½ seconds. I should hate to compare the experience of flying over a country with experience of walking through it, but I do honestly think that those are the only two ways in which you can get an impression of a country; two entirely different impressions but both extremely vivid. In the air of course you only get impressions through one sense, that of sight, whereas in walking through a country you employ all your senses and I think probably your skin, if you stay in some of the Badawin huts.

That really is one of the inconveniences of travel in the air which one cannot overcome.

There are still a great many points about the Hadhramaut which still puzzle me. For instance, at the western end where Miss Stark first went in, the valley, as she described it is about 7 miles wide between enormous cliffs, whereas at the other end, some 150 miles farther to the east, just before the stream, which is only a trickle, breaks through the coastal range of mountains and eventually reaches the sea, it is only about 100 yards wide. There are no signs, as far as one can see from the air, of the stream as it passes through the mountain barrier ever having been a great raging torrent. It seems extraordinary that the valley should be so wide at its source and so narrow where it just gets into the sea.

Then again, so many of the towns one sees from the air are, like Shibam, closely fortified, one big fort, but next door one sees Saiun where it straggles out into the suburbs, a sort of garden city, with houses in their own lovely gardens. Again from the air one wonders why. To-night Miss Stark has explained why.

On the whole, I think that walking through a country one does really get more of the essence of it than one ever can by flying over it, though I do say, in mitigation, that if one does not have the opportunity of walking then as a next best one does get at any rate some impression by flying.

The PRESIDENT: Squadron-Leader Rickards is here and it was he who laid out the aerodrome at Shibam, the existence of which enabled Miss Stark to get to Aden when she became seriously ill.

Squadron-Leader RICKARDS: I am honoured to be called upon to speak, and it gives me very great pleasure to be here to-night. I have spent seven years in Aden and have visited the Hadhramaut twice on foot and five times by air. My opinion is that the majority of airmen are frightfully selfish; we, as airmen, are often content to sit in our aircraft and feast our eyes on beautiful surroundings and mysterious country such as the Hadhramaut. I am thrilled to hear some one who really is competent and capable of expressing and explaining to others what she has seen. The Hadhramaut is really full of most interesting things, and there remains much more to discover about the country and the people.

We have to thank persons like Miss Stark and Colonel Boscawen (Dr. Wiseman) and other travellers for really getting down to facts, and not merely rushing from A to B as we government officials are so apt to do, with all our comforts carried in aeroplanes. I am not here to lecture to-night but have been given the opportunity to make comments. I am in a position to confirm that Miss Stark has described her very strenuous journey in a most able manner. It was indeed a great undertaking for one who is not travelling as a government official. It is hoped that Miss Stark will be able to make another visit to the Hadhramaut, let us hope she has better health and luck next time.

Colonel LAKE: I have listened with the greatest interest to Miss Stark's lecture and it is a pleasure to have seen her excellent photographs and cinematograph. I do not think it is generally known that the Hadhramaut forms an integral part of the Aden Protectorate. You see it put on maps as right out of the Protectorate, well to the east, but actually the Aden Protectorate extends a bit further east than the Hadhramaut, to a point called Dharbat al 'Ali which is contiguous with the province of Aman under the Sultan of Muscat.

I was fortunate enough in 1929 to be a passenger with Wing-Commander Cochrane when the Royal Air Force made that reconnaissance over the Hadhramaut and took a whole lot of wonderful photographs. Twice since then I have flown over it. The second time was with the Resident, Sir Bernard Reilley, and Group Captain Boyd, who was commanding the British force at the time of our return. That time, instead of taking the ordinary route back *via* Mukalla and

along the coast we went direct from Shibam to Aden without touching the coast, and I think we must have gone very near to Shabwa; but unfortunately it was one of those bumpy days and one of those many occasions when I as passenger in a machine completely lose interest in all my surroundings.

Miss Stark talked about the insecurity of the eastern part of the Hadhramaut valley. It certainly is insecure, but I am glad to say that a scheme is now on foot to better this which contains, amongst other things, a plan for arranging tribal guards to bolster up the authority of the Sultan, a scheme tried last year with considerable initial success in the Aden Protectorate closer to Aden; and I feel sure it will also be successful in this part because there is a rich merchant colony there of which Miss Stark has spoken. They would probably be only too willing to finance any scheme which aimed at giving them and other people security.

It may interest Wing-Commander Cochrane and Squadron-Leader Rickards to know that there is now wireless communication definitely established between Mukalla and Aden. It has been wanted for a long time. I may say that the scheme was first suggested by the Sultan of Mukalla in 1912, twenty-three years ago. I do not want to suggest that was entirely the fault of the Indian Government in whose charge the Hadhramaut was at that time. It was owing to a variety of reasons: the war, change of Sultans, and the fact that the Sultan of Mukalla could never make up his mind whether he could pay for the wireless communication or not. Now it is definitely established and I think it will be a great help to local shipping and also to the Royal Air Force.

I hope that if Miss Stark should wish for and be granted facilities for making another attempt to reach that mystical town, Shabwa, she will find it all she hopes it to be in historical and archaeological interest. I think if she goes next year she may be able to fly in a civil machine from Aden to Shibam. Anyhow, it was very bad luck that her health failed, and I wish her better luck next time.

The PRESIDENT: I do not think there is any one else with us who knows the country, and as it is almost time to close the meeting I should like to tell you that although she has been passed physically sound Miss Stark is not yet thoroughly fit. She is still by way of being convalescent, so it has been no small effort to her to come here to-night and give us this charming lecture. She can go away feeling that she has thoroughly held her audience. I know that we have all greatly enjoyed her lecture and the delightful way in which she delivered it.

I will not make any comments now except to say that on seeing the photographs which Miss Stark put before us and those taken by Squadron-Leader Rickards that we saw some years ago one is struck by the extraordinary combination and contrast of those up-to-date sky-scraper buildings with the primitive dwellings—almost huts—and thatched bazaars, all round them. It is an extraordinary advance in building, and I do not think we have yet fully realized the connection between these villages in the Hadhramaut alike with Hyderabad, and with Java and Singapore. As Miss Stark has explained to us, you find that half a family live in Singapore and the other half at home, changing dwelling-places periodically. There is no doubt that civilization is creeping into the Hadhramaut very rapidly now, and I am afraid the thoroughly unsophisticated conditions will not exist much longer. We can only hope that when Miss Stark is thoroughly fit she will be able to start where she left off and carry out the exploration she was hoping to do. To my mind a journey from Mukalla right along the hinterland, through the western confines of the great Arabian desert to Taif would be a very fine piece of travel, about the only piece of the Arabian peninsula that is entirely unexplored. I ask you now to join me in giving Miss Stark our best thanks for her very charming lecture.

THE CANADIAN HYDROGRAPHICAL SURVEY OF THE HUDSON BAY ROUTE

F. C. GOULDING SMITH

A new chapter in the charting of Canada's northern seaway began with the development of the Hudson Bay Route as an outlet for the products of the Canadian prairies. Hitherto the route was used principally by the fur traders and while well-charted ship-channels to other world ports were buoyed like picket fences and lighted like city streets, the northern skippers played a lone hand against the elements—but with great success. To such an extent do early nautical charts reflect the voyages of arctic explorers that it may be said that in these charts is written the history of the northern regions. These old cartographic representations served the limited demands of their day, but as navigational needs become more exacting they are being superceded by ones more modern. In comparison with the more southern settled coasts of Canada, the history of Hudson Strait and Hudson Bay has been written slowly, and consequently a great part of the present-day chart of this region is simply a compilation of exploratory sketches made by Captains Lyon, Coats, Parry and other of their great contemporaries. The existing general chart of Hudson Bay and Strait which is on the very small scale of about 30 miles to an inch, covers an area of over 250,000 square geographical miles. Its huge areal extent may further be realized by the fact that it covers no less than 14 degrees of latitude and 35 degrees of longitude. When one is acquainted with the difficulties entailed in northern work the magnitude of the task involved in the detailed charting of Hudson Strait and Bay can be appreciated. It is the purpose of this paper to present, briefly, an outline of some of the more recent charting expeditions and to give with more detail an account of the work of the Canadian Hydrographic Service of the Dominion Department of Marine.

A distinct contribution to the modern charting of Hudson Strait was made by the 1931 Oxford University Exploration Club's Expedition to Akpatok Island, led by Mr. Hugh Clutterbuck and sponsored by the Royal Geographical Society. Unfortunately this exploration cost the life of one of its members, but some of the results of the expedition were immediately reflected in the nautical charts and "Sailing Directions" and another chapter in the interesting history of Hudson Strait has been added by the activities of these British scientists. During the five years previous to the Great War the Canadian Hydrographic Service was actively engaged in charting operations in Hudson Strait and Bay, the expeditions at that time being under the command of Captain F. Anderson, the present Dominion Hydrographer. During the war and until 1928 this northern charting was held in a sort of suspended animation: most of the personnel had enlisted for overseas service and the accumulating work in more southern Canadian waters required all the available personnel and equipment of the Dominion Service. With the selection of Churchill in 1928 as the terminus of the Hudson Bay Railway the charting of the Hudson Bay Route received new impetus. In that year I was put in charge of a small party to carry out a survey of the coast from Churchill to

Cape Churchill. The survey began from a chained base at Churchill and the triangulation was carried eastward to the cape. At each station observations were taken for magnetic variation. The survey was plotted on a scale of 1 mile to 1 inch and the result established the fact that the coast from Churchill to the cape trends slightly south of east instead of well to the north of east as shown on the then existing maps and charts. At Churchill a self-registering tide gauge was installed and has since been kept in operation as a principal tidal station for the Bay. The following year (1929) the Canadian Hydrographic vessel *Acadia*, with Mr. J. U. Beauchemin in charge, was detailed for this work. She is equipped with an Admiralty echo-sounding gear and a Sperry gyroscopic compass. During the season the chart "Cape Churchill to Churchill Harbour," begun by me the previous season, was completed with soundings, and sufficient information was obtained for a new issue of the Churchill Harbour chart. In 1930 with the same ship we completed the charting of the west coast of Hudson Bay from Churchill to Hubbart Point, about 30 miles northward. Because the low coast is bordered with extensive drying flats and shallow water to about 8 miles offshore, the landing of material for the erection of high beacons proved to be a slow undertaking. As the low-lying and almost featureless shoreline offered little guidance to navigation, no time was used in traversing or sketching, the delineation of the coastline between the stations being obtained from aerial photographs by arrangement with the Royal Canadian Air Force. The season of 1931 was the last year in which the *Acadia* was engaged in northern work, and at that time completed the charting from Hubbart Point to Egg Island on the west coast of the bay. The same year, with Mr. A. K. Laing as assistant and a small crew, I disembarked at Wakeham Bay in Hudson Strait with the object of charting this fjord and its approaches. Here the Canadian Government buildings erected by a previous aerial expedition to ascertain ice conditions in the strait, made an ideal base from which to conduct charting operations.

The south coast of Hudson Strait from Cape Prince of Wales trends in a general west-north-westward direction 80 miles to Cape Weggs, this stretch being fronted by numerous islands. The rugged coast is pierced by two magnificent fjords, Wakeham Bay and Douglas Harbour, both of which provide excellent anchorage for ships. Wakeham Bay, 15 miles westward of Cape Prince of Wales, is the finest fjord in Hudson Strait. Through high bare hills of rock it penetrates 15 miles into the land. Its waters are very deep —over 100 fathoms in places—but excellent anchorage can be obtained. Throughout its length the bare rocky headlands, the towering perpendicular cliffs and rugged hills present a scene of impressive beauty. Twenty-two miles north-westward of Wakeham Bay is Douglas Harbour, a two-armed fjord which projects $11\frac{1}{2}$ miles into the land. Tumbling cataracts and towering rocky hills characterize both arms of the fjord, but the south-east arm lacks the grandeur and austerity of the south-west. The harbour is capacious, well sheltered from the sea and suitable anchorage can be obtained almost anywhere. At Wakeham Bay a base-line was measured and from this a triangulation net was extended to embrace the fjord and the outside coast to Cape Prince of Wales and to the west end of Wales Island. Observations were taken for latitude, longitude, and azimuth, and in the ensuing weeks the shores

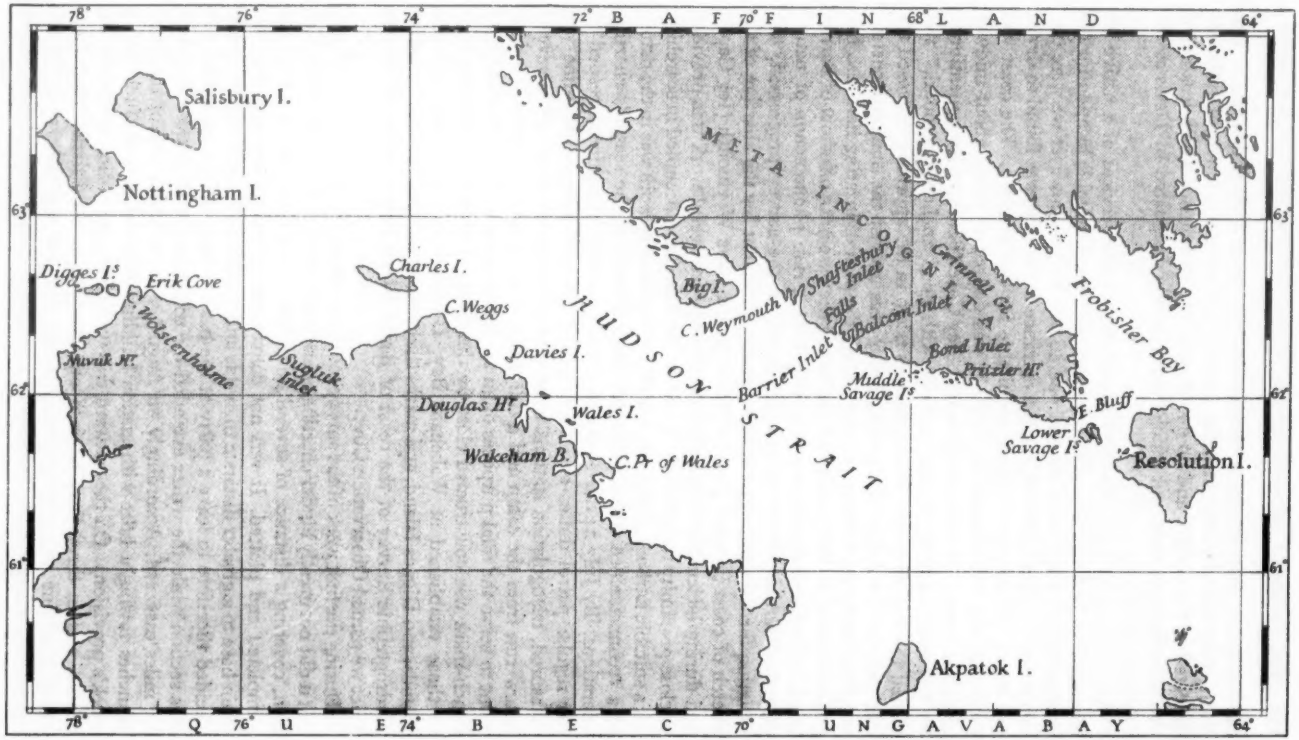
were coast-lined, sounding was carried on and shoals were examined. At the various stations throughout the locality magnetic variations were determined, and during the course of the survey every opportunity was taken to sketch the rugged topography of the district. An important feature of the hydrographic work in Hudson Strait is the determination of the tidal characteristics. For this purpose, as well as for the reduction of soundings, staff gauge readings were taken throughout the duration of the survey. The outstanding feature of the tide here is a most unusual difference in range between extreme Spring and Neap tides: the former range (31 feet) being nearly four times the latter (8 feet). On October 6 the *Acadia* on her final homeward voyage called for us at Wakeham Bay and both parties joined in ship-sounding and in making a large-scale plan of Fisher Bay, a rather confined anchorage a few miles west of Wakeham Bay.

The year 1931 was a banner year in the charting of these northern waters, for while the *Acadia* was surveying in Hudson Bay and we were charting the strait, the infallible "moccasin telegraph" of the north spread the news that still another scientific expedition was located on Akpatok Island. This of course proved to be the Oxford Expedition previously alluded to. A little farther east on the Labrador coast the Grenfell-Forbes Expedition was engaged in making an extensive aerial survey. But these four were not all the geographic expeditions to this region in that year. At Wakeham Bay we were visited by the transatlantic flyers, Cramer and Paquette, who were investigating a northern air route from Detroit to Europe *via* Greenland and Iceland for the Trans-American Airlines Corporation. They stayed with us for two nights, and we were able to supply them with some engine oil. Engine trouble had developed before they landed, and although it was apparently adjusted before leaving Wakeham Bay the fliers found great difficulty in taking off. After many attempts however the plane took to the air, the course eventually taking them to Orkney Islands, but fatal disaster befell them shortly after. The following year on July 2, with Mr. T. M. Tardif as hydrographic assistant and a small crew, I proceeded from Quebec to Hudson Strait aboard the Canadian Government Hudson Strait patrol vessel *N. B. McLean* with the object of extending the survey of the previous year from Wales Island to Charles Island, some 70 miles north-westward. We arrived at Douglas Harbour on July 22 and during the next fortnight great strides in charting operations were made. On August 7 the triangulation of the approaches to Douglas Harbour being completed and plotted, a party was left at the base while I with another small crew made a trip westward to Charles Island in one of the motor-boats. We towed two dories—one filled with lumber and station-building material and the other with camping gear and twelve days' provisions. Our plan was to build triangulation stations along the coast on the westward trip and to carry on the instrumental observations and coast-lining on the return. Cape Weggs was reached on August 10 at 1 a.m. and the next day we crossed to Cape Moses Oates on Charles Island. Here a large triangulation beacon was built, a check base-line was measured and sun azimuths were taken morning and afternoon in order to check the accuracy of the triangulation.

Having now reached the western limit of the season's operations, we headed

eastward, observing and coast-lining as we progressed. There are no harbours in this 60-mile stretch of open coast so at night we anchored in the open, or under one of the small off-lying islands. On the night of August 12 while anchored under Davies Island, a full gale struck and lasted for three days, but it was weathered by frequently shifting our boat anchorage. When the gale subsided somewhat we proceeded eastward and by midnight of the 15th were back at the base camp in Douglas Harbour with the triangulation and coast-line completed. In the meantime the party working at the base had done considerable coast-lining and sounding in the approaches to Douglas Harbour. The weather was now very unfavourable and it was only with difficulty that any progress was made. Whenever possible the boats worked outside or the mountainous topography was delineated. Captain Balcom of the *N. B. McLean* gave us the use of the ship for three days' ship-sounding, and on another occasion, in order to save a long run for the boats, the ship was anchored outside as a temporary base. During the course of the survey an extended series of astronomical observations were taken, a long-wave time-signal receiving set being of great assistance in assuring a high degree of accuracy. The patrol vessel called for us on October 14, and after a rough passage down the Labrador coast, during which the ice-breaker gave a good demonstration of her remarkable rolling powers, Quebec was reached on October 29. From the results of the season's work it was found that the innovation of charting Hudson Strait by means of small launches transported north on the patrol vessel was very economical. It was decided therefore to continue this convenient method.

In 1933 the scene of operations was changed to the south-east coast of Baffin Island, from Pritzler Harbour to Cape Weymouth (Ice Cape), as the available information relative to this part of the Hudson Bay route was limited and decidedly vague. On the existing general chart the coastal representation was based on a compilation of exploratory sketches made by early navigators, and the physical features shown were greatly distorted. On the chart a prominent headland protruded in the vicinity of Icy Cove and the coast was broken by great fjords of a nature to suggest good harbourage. The geographic positions of important parts of the coast were most seriously in error, and a vigia 15 miles from shore, known as the Griper Rock, served as a warning of the uncertain nature of the cartography. During our previous season in Hudson Strait it had been found that the use of tents for a main base was far from satisfactory as several times they had been ripped and torn by the great force of the wind in the fjords. Though well guyed, battened, and propped, during one particular blizzard five out of the six tents completely collapsed, the office tent caught fire and the party was temporarily without shelter. For this reason three sectional wooden huts were constructed for use as office and surveyor's accommodation, crew's quarters, and a cook-house. The party sailed from Quebec on July 9 aboard the *N. B. McLean* and arrived off Resolution Island a week later. While cruising off this island awaiting an opportunity to unload some equipment at the radio station, we used the new Admiralty echo-sounding instrument for obtaining soundings for chart use. On this north side of the entrance to Hudson Strait the graph of the sea floor showed a series of canyon-like troughs not unlike the topographic features of


78°
76°
74°
72°
BAFFIN LAND
70°
68°
64°
Salisbury I.
Nottingham I.
63°
METAINCOGNITA
Digges Is
Erik Cove
Charles I.
Big I.
Shaftesbury Inlet
Gartnell Gr.
Frobisher Bay
C. Weggs
C. Weymouth
Falls
Balcom Inlet
Bond Inlet
Pritzler Pt
Mukik Pt.
C. Wolstenholme
Sugluk Inlet
Davies I.
HUDSON STRAIT
Barrier Inlet
Middle Savage Is
E. Bluff
Lower Savage Is
Resolution I.
62°
Douglas Pt
Wales I.
Wakeham B.
C. Pr of Wales
61°
Akpatok I.
QUEBEC
UNGAVA BAY

the bordering coast which is characterized by great cliffs and ravines. The strong tidal streams here, striking against these deeply submerged cliffs, are deflected to the surface and no doubt cause the turbulence which was noted by the early navigators and which was originally designated by Davis as the "Furious Overfall."

After calling at Lake Harbour to arrange for the services of a native we anchored off Jackman Sound in the hope of finding a suitable location for the establishment of the main base of operations. In this however we were disappointed as, upon examination, the entrance to the inlet was found to dry at low water, making it of course unsuitable for our purpose. The coast was then explored with motor launches. It was desired to locate about midway along the stretch of coast to be charted. Icy Cove (Balcom Inlet), mentioned by Captain Coats as "a safe harbour with good anchoring ground," was visited the following day, but soundings taken in the approach disclosed the fact that, at low stages of the tide, heavy seas against the outgoing current would break to the bottom. Consequently the plan of locating here also had to be abandoned. We eventually established the base in an off-shoot of Barrier Inlet. This fjord possesses a reversing falls, a rare phenomenon of nature described farther on in this paper. Later, as the survey progressed, this situation for the camp proved to be most convenient for the charting of the stretch of coast between Pritzler Harbour and Cape Weymouth (Icy Cape), and during inclement weather plenty of scope for useful work was provided in close proximity to the fjord. Two fine days had been occupied in searching for a suitable harbour, but it was felt that this necessary work was in the nature of a reconnaissance which facilitated the planning of the season's charting operations. By July 24 our equipment was unloaded; the ship proceeded on her regular patrol duties and we occupied the new base. A base-line was measured, triangulation stations were built along the coast to within several hours' run from the camp and a tide-gauge was erected. A concrete monument to serve the dual purposes of an astronomical pier and permanent tidal bench-mark was constructed close by the camp. This monument is similar to those established at Wakeham Bay, Douglas Harbour, Lower Savage Islands, and Digges Island, and marks the starting-point of the first Canadian Hydrographic Survey of the coast of Baffin Island. This branch of Barrier Inlet we named Observation Cove.

During the first week of the survey some ice was encountered close to shore, but it did not greatly hinder charting operations and on August 2 the triangulation, covering a distance of several hours' run from Observation Cove, was completed and plotted. It was not convenient to work daily out from the main base to a greater distance than this and to return the same night. It was decided therefore to leave a party at the base to carry on the coast-lining of this section while the writer extended the triangulation to Pritzler Harbour, 45 miles eastward. Accordingly on August 3 we left with one of the small launches towing a boat with station-building material, a tent, fuel, and a week's provisions. On the outward trip we built triangulation and sounding marks, and in three days reached our destination. At Pritzler Harbour a check base-line was measured and a sun azimuth was observed. On the return run triangulation observations were taken at each main station and on

the evening of August 9 we arrived back at the main base with the week's project completed. Meanwhile the party working from the base had made very good progress, evidently having taken full advantage of the long hours of daylight in that latitude. Three days later another trip was made to eastward. On this second trip we coast-lined the mainland shore and the numerous islets to abreast of the Middle Savage Islands. At the western end of this group is Henry Hudson's "Isle of God's Mercie," described by Hudson and Pricket in "Purchas His Pilgrims." From these quaint references we had no difficulty in identifying the place. The average mariner would consider it a most unmerciful place and consequently Hudson's appellation does not appear on the chart. It is not far from here that the *Griper* touched some obstruction two hundred and fourteen years later.

One of our objectives was to search for and verify if possible the existence of this Griper Rock which on the old and existing charts of this region was shown as a vigia some 15 miles from the coast. In the given position we found a depth of 100 fathoms, the whole locality having a regular bottom without indication of any danger. We concluded therefore that the obstruction must lie in the extensive foul ground that closely skirts this whole stretch of coast and from which the depths fall off very steeply to seaward. This surmise was confirmed on our return to Ottawa by a careful reference to Captain Lyon's account of the voyage of the *Griper* in 1824 and by a "fix" taken from Captain Lyon's small-scale chart and replotted on the 1933 chart. On September 1 came the first snow-flurries of the season. A few days later, with the object of extending the charting westward to Cape Weymouth (Icy Cape), the whole party left with both launches and made a temporary base in a fine fjord which we found a few miles eastward of the cape and which we named Shaftesbury Inlet. While in this vicinity we experienced the worst storm of the season—an easterly gale which for several days and nights threatened disaster to our equipment. However beyond the gig foundering at her mooring and the tents being torn no material damage was done, and on the night of September 13, with the charting completed to westward, we arrived back at the main base.

In completion of this résumé of the charting of this part of Baffin Island a few words descriptive of the coast might be of interest. In aspect the south-eastern coast of Baffin Island is very bleak, bare rugged hills of gneiss and granite rising to elevations of about 600 feet close to the sea and to greater heights inland. The ragged shore is broken by numerous fjord-like inlets, but from Pritzler Harbour to Barrier Inlet the shore is fronted by many islets, rocks, and shoals of a most dangerous character. The 50-fathom contour, which lies at an average distance of 3 miles off the islands, should be considered the danger line. The country is quite uninhabited except for some Eskimo who travel gregariously along the coast in whaleboats. These natives appear to be of a very good type—healthy, honest, and well adapted to the rigours of the country. Their habitat is both the north and south coasts of the long peninsula which separates Frobisher Bay from Hudson Strait. The small, swift rivers which flow into the heads of the inlets are well stocked with a fine species of salmon trout weighing up to 8 lbs. or more. This food, together with seal, constitutes their chief diet. At certain times of the year a caribou

hunt takes place and the hunters travel inland for several days to secure fresh meat. In addition the country also provides aquatic fowl, ptarmigan, arctic hare, and an occasional walrus and polar bear. In this locality the tides rise to a height of 35½ feet in spring, necessitating great caution when anchoring at night. Tidal streams run violently between the islands and when the wind opposes the current a heavy sea is created. Close to the southernmost islet of the Middle Savage group the current was observed to run upward of 5 knots at the times of spring tides. Unfortunately there are no good ship harbours between Pritzler Harbour and Barrier Inlet. The former has good depths and the approach appears to be clear, but it is rather open to southerly winds. Bond Inlet, nearly abreast of Saddleback Island, provides deep land-locked anchorage, but it is rather spoiled by the long approach between the islands and the narrowness of the entrance to the anchorage basin. Jackman Sound, 8 miles westward of Saddleback Island, dries at low water except for a small portion immediately inside the drying entrance. Balcom Inlet (Icy Cove) offers good, deep, landlocked anchorage and would make an excellent harbour for wintering ships, but it cannot be entered at all stages of the tide and the offing was found to be strewn with dangers.

A most interesting fjord is one which we named Barrier Inlet, an arm of the sea extending 12 miles inland with an average width of about half a mile. The funnel-shaped entrance to the fjord is about 1½ miles wide, but 2 miles inside the width contracts to three-quarters of a mile. Here the channel is still further constricted by a number of rocky islets connected at low stages of the tide and leaving only two narrow channels, less than 100 yards wide. Inside this fjordal barrier the water is deep. The free flow of the tide in and out of the inlet being thus obstructed at the narrows, a "head" of water is formed and creates reversing falls. At the time of low tide on October 1 there was a sheer outward waterfall 8½ feet in height, and the lowering of the fjordal waters continued for a space of 2½ hours whilst the tide was rising outside at the foot of the cataract. Slack water occurred for a few moments when the flood tide reached the elevation of the water in the fjord, but almost immediately the inward rush of water formed whirlpools and great eddies, and soon waves 6 feet high careened wildly from side to side. The roar of the falls could frequently be heard for miles. A boat attempting to pass through at such a time would be engulfed. These falls, discovered this year, are one of the most remarkable natural phenomena in the Canadian Arctic archipelago. At Full and Change of moon they are comparable to the famous reversing falls on the Saint John River, New Brunswick, and much greater than the renowned Saltstraumen (Saltens Malstrom) in Norway. Shaftesbury Inlet, about 3 miles eastward of Cape Weymouth (Icy Cape), is a bold fjord penetrating northward into the land between high, flanking, rocky hills. It is 8 miles long and varies in width from half to 1½ miles with deep water close to the shores. About 5 miles inside a beautiful cascade tumbles over a high cliff which rises sheer from the water. Near the termination of the inlet an Eskimo encampment is located beside a stream flowing in over a series of wide, rocky steppes. Another swift stream debouches at the head of the fjord. The inlet is free from shoals and provides shelter in suitable depths, but the entrance is encumbered with a dangerous rock and requires very careful navigation.

During the season of 1934 I continued the charting of the south-eastern coast of Baffin Island, with Mr. T. M. Tardif again as assistant and a crew of ten seamen. This work, which was a 75-mile extension of the previous season's charting, embraced the coastal area between the Lower Savage Islands and Pritzler Harbour. The survey was outfitted with two 27-foot launches and a covered-in surf boat of about the same dimensions. The latter, which was towed from place to place, provided galley and sleeping accommodation of sorts, and was also used for transporting station-building and other equipment required for a two-weeks' trip away from the main base. A main feature of that year's equipment was the installation of an Admiralty echo-sounding gear in one of the 27-foot surveying launches. This instrument is a recording type and operates from three 12-volt batteries. A portable electric generating plant for charging the batteries was supplied with the set and installed in the launch. Preliminary tests with this instrument at Quebec before our departure for Hudson Strait proved that the instrument was actually capable of registering depths as shallow as 1 foot. In Hudson Strait the instrument had to contend with great depths and work under sub-arctic conditions. It was guaranteed by the makers to obtain depths of 100 fathoms, but actually this was greatly exceeded. In Gabriel Strait for instance over 200 fathoms were recorded under most trying conditions. Condensation due to cold currents of air from the Grinnell Glacier kept the coast of south-eastern Baffin Island enveloped in a dense, wet fog for days at a time so that everything aboard the boat was in a perpetual wet state—a condition conducive to rust, etc., in instruments. As we were to be away from the base for a week or ten days at a time any repairs or adjustments would have to be made on the spot and without the facilities of a machine-shop or ship's engine-room. Furthermore, the coast is exposed and the tidal currents are heavy with the result that sounding often had to be done in a heavy sea. Notwithstanding these adverse conditions the instrument functioned excellently. Without its use it is extremely doubtful if sufficient information could have been obtained to complete the chart in the one season. Certain it is that, due to the short charting season in Hudson Strait, this survey cannot afford to be without one in future.

The patrol vessel left Quebec on July 10, and after calling at several radio stations in Hudson Strait and loading our Arctic huts at Barrier Inlet where they had been left the previous season, the ship arrived on August 1 at Lower Savage Islands, where our main base was then established. As it was our intention to commence the season's charting at Pritzler Harbour where it had been terminated the previous year, we availed ourselves of an offer by Captain Balcom to transport us as far as that place. Here on August 5 with both launches we left the ship at 2 a.m. about 8 miles off and that day commenced the season's main charting by building triangulation stations to the eastward. As the charting operations progressed along the coast it was evident that the existing small-scale chart bore little resemblance to the actual configuration of the coastline. Because of this and as we had no native pilot aboard, we were unable to plan to reach any particular anchorage at night or any refuge in case of sudden storms. We made use of any place that came to light as the coast was explored. Inclement weather with dense fog which descended from the

Grinnell Glacier and clung to the land for days caused considerable delay, but on August 11 we reached a point 9 miles westward of East Bluff at the entrance to Gabriel Strait. With the object of completing the charting of one stretch of coast at a time, we retraced our course and observed at each station built on the eastward trip. We reached Pritzler Harbour again on the 17th, and the next day, with the object of renewing supplies of which we were running short, started for the main base on Lower Savage Islands. Here we arrived on the 19th and were storm-bound there until the 22nd. The interval was not lost however, as the time was required for calculating and plotting the triangulation, erecting a tide gauge and also a radio aerial for the reception of time signals.

When the weather cleared we again proceeded westward with both launches and ten days' supplies: one party to engage in sounding with the use of the new echo-sounding gear, and the other party to do coast-lining. Gabriel Strait was fairly calm when we crossed, but in places neither launch could stem the strong eddies, and in the attempt one of the dories which we were towing filled and added to our difficulties. A week later we arrived back at the main base. On September 3 we left on another week's trip to continue the charting of Baffin Island in the vicinity of Gabriel Strait. Crossing Gabriel Strait in our small boats could always be depended upon to be something of an adventure, and this time was no exception as fall weather had definitely set in. For three days we rode at precarious anchor a few miles west of East Bluff during a violent easterly gale. From then on until the end of the season we experienced a continuous series of gales and snowstorms, but sufficient information was obtained for a new coastal chart "Lower Savage Islands to Pritzler Harbour" on a scale of 2 miles to 1 inch and the tidal characteristics for this part of the strait were determined.

The coast of Baffin Island and vicinity charted during the season of 1934 may be described as follows. The Lower Savage Islands, separated from Baffin Island by four miles of turbulent water, form a distinct group of three main and several small islands characterized by the same rugged topography as south-eastern Baffin Island and Resolution Island. Bare, rocky hills in great disorder rise to a height of 720 feet above the sea. Owing to the exceptionally exposed position the islands are almost destitute of vegetation even in the declivities, and present a most desolate and chaotic appearance. With the exception of the low south-western end of the group the Lower Savage Islands present a formidable seaface composed of a succession of lofty cliffs rising sheer out of the water. The strong tidal streams of Gabriel Strait, striking heavily against the Savage Islands are sheered abruptly from their course and the accelerated, swirling currents cause a confused sea with whirlpools and remarkable tide-rips. Even on fairly calm days there occur areas of sharp uprisings of the sea like a great boiling-up. Two narrow passages separate the main Lower Savage Islands. These passages converge to meet at their southern entrances near the south-eastern end of the islands. In the eastern of these passages, and close inside its northern entrance, is Savage Harbour, surveyed by Captain F. Anderson in 1914. A ship at anchor here can obtain fresh water by carrying it in boats from a small cascade on the west side of the eastern passage. In one place, near its southern entrance, the

eastern passage nearly dries at low tide. The western passage is of similar character, narrow, but somewhat deeper and with steep, high cliffs on either side. An imposing promontory, known as East Bluff, stands boldly at the south-eastern extremity of Baffin Island. It is the southern termination of a great high wall of solid rock extending for $3\frac{1}{2}$ miles along Gabriel Strait. Severe in aspect, it rises precipitously out of very deep water to a height of several hundred feet. Tidal currents sweep furiously past the cliff and impinging on the Bluff are, like the currents striking the Lower Savage Islands, deflected well out into the strait. During Spring tides navigation in small boats in Gabriel Strait is often hazardous. In this connection Captain Balcom of the *N. B. McLean* reported that when tidal currents were strongest the ship was set strongly towards the islands and very careful handling was necessary. The scenery is wild near the Bluff. From this great headland the ragged coast of Meta Incognita trends abruptly to the north and to the west. The shore is pierced by many small incursions of the sea and is fringed by many skerries. Outside these rocky islets the water is deep and apparently free from obstructions. In Gabriel Strait the echo-sounding instrument recorded a depth of 234 fathoms only $1\frac{1}{4}$ miles from the land. The Grinnell Glacier, which overlies most of the peninsula, approaches to within 6 miles of Hudson Strait and nowhere does it discharge any icebergs. The bare strip of country between the edge of the glacial ice-cap and the sea is very hilly and deeply scored by glacial action. In the summer the melting glacier gives rise to numerous swift rivulets which flow through a series of lakes and rapids to join the sea at the bottom of the bays and inlets. In many of these glacial streams sea-trout abound and are greatly depended upon by the natives for food.

About 9 miles north of East Bluff is Noble Inlet, which affords anchorage in suitable depths and good shelter in all winds. The harbour is about 5 miles long and about half that width across the mouth, but a group of islands lying in the entrance and protecting it from seaward forms two narrow entrance channels. The north channel, useful only for small boats, is only about 150 feet wide, but the western one is 3 cables in width and has a depth of 11 fathoms. A conspicuous sugar-loaf shaped hill on the western side of the harbour can be seen from a long distance off and is a good landmark for which to steer when making for the inlet. Extending about 6 miles eastward of Noble Inlet is a labyrinth of low, rocky islands providing shelter for small boats. This locality is a good hunting ground for seal and walrus and is frequently visited by natives from both Hudson Strait and Frobisher Bay. Nine miles westward of East Bluff is the low southern extremity of Baffin Island. Here a cluster of islets and rocks known as South Reefs has, from east or west, the appearance of a long spit jutting out to sea. Boats waiting a favourable opportunity to round East Bluff can obtain shelter in small bays in this vicinity and under the lee of the islets. Fourteen miles west of East Bluff the coast is higher and is pierced by an exceedingly narrow gorge, named Nannuk Harbour, a snug little inlet providing good shelter for schooners. This miniature fjord is $2\frac{1}{2}$ miles long, only $1\frac{1}{2}$ to $2\frac{1}{2}$ cables wide, and has depths of from 5 to 10 fathoms. Fresh water can be obtained from a small overhanging fall on the west side, half a mile inside the western entrance point. A small

trout stream debouches at the head of the inlet. Flanking the eastern side of the fjord a range of high hills rises to a rugged escarpment. The eastern side is the higher of the two and its slightly projecting entrance point extends the farther south. The western point is low and shelving, but between the two is a depth of 25 fathoms. Between Nannuk and Pritzler Harbours, 30 miles west-north-westward, the 20-fathom contour lies 1 to 2 miles off with numerous islets and reefs between it and the land. This stretch of coast is indented by many small inlets a mile or two in length and used by the natives during their migrations along the coast. A forked inlet about 4 miles long occurs about 3 miles eastward of Pritzler Harbour. Here schooners can find good shelter in suitable depths but from the sea the entrance is masked by an extensive array of rocky islets and drying reefs. Pritzler Harbour, previously alluded to in this paper, is the best of the harbours in this vicinity.

We found some intriguing wreckage on the south-western end of the Lower Savage Islands: old pieces of heavy sail canvas, a block, several single sheaves, a belaying pin, the top of a topmast and a Royal yard about 35 feet long with the life and clewline bands still on. Strewn about also were several turned legs of a cabin table, parts of a stove and a small quantity of hard coal. Iron hoops, barrel staves and a large pile of rusty hoop iron bespoke the wreck of a whaler. At the time we were unaware of the identity of the craft which had come to grief or of the fate of the crew. After a careful search amongst the "Voyages" in that locality I found, in the Appendix to the volume 'Arctic Researches and Life among the Eskimaux' by the noted explorer C. F. Hall, a most vivid account of the wreck in 1863 of the whaler *George Henry* on these savage islands. In this book a picture of the vessel in winter quarters is further identification of the wreck. Our find is of some historical interest, for on this barque Hall in 1860 voyaged north to Frobisher Bay which he mapped and where he made his famous discovery of the Frobisher relics. The discovery of the remains of the barque appears as a fitting sequel to the charting of south-eastern Baffin Island, the chart of which joins Hall's map at the southern entrance to Frobisher Bay.

During the season of 1935 I continued the charting of the Hudson Bay Route, with hydrographic assistants T. M. Tardif, R. L. B. Hunter, and a crew of eleven seamen. The scene of operations embraced an extensive area in the vicinity of Digges Islands and extended from 10 miles east of Erik Cove to about 12 miles beyond Nuvuk. This area, being at the turn between Hudson Strait and Bay is a most important part in the navigation of the waterway. The equipment of the survey included a 27-foot launch and a 36-foot cabin cruiser *Henry Hudson*, the latter having been specially designed for work in northern regions and built at the Department of Marine yard in Quebec. This craft has sleeping and galley accommodation for eight persons and is fitted with an Admiralty echo-sounding instrument. We left Quebec on July 14 aboard the *N. B. McLean* and arrived at Erik Cove on July 30. Here astronomical observations were taken and the triangulation begun. We then crossed to Digges Islands to search for a site suitable for the season's base which eventually was established in Digges Harbour, a small but perfectly land-locked inlet in the eastern end of the western Digges Island. Here moorings were placed for the launches and an automatic tide-gauge was

1. The western reach of Wakeham Bay, Hudson Strait

2. Cliffs close to the entrance of Wakeham Bay

3. Erik Cove

4. Reversing falls at Barrier Inlet

5. Looking W. from Doctor Island, on the S. coast of Hudson Strait

6. Canadian Govt. radio station at Cape Hopes Advance, Hudson Strait

installed and kept in operation for two months. During the season the patrol vessel was used for sounding an extensive offshore area and in the determination of magnetic variation at several places about 10 miles off.

A main feature of this year's hydrographic work was the charting of a fine deep-water channel inside of the Digges Islands and close to the continental coast. This hitherto unknown passage into Hudson Bay we named Digges Island Sound. It extends for a distance of 22 miles from Wolstenholme to the westernmost islet, is over 100 fathoms in depth and is so straight that two courses only are required. It has the advantage of being ice-free in the late fall for some ten days after the usual ship's route north of the Digges Islands is filled with ice from Foxe Channel, the outsweep of the Hudson Bay current tending to prevent this northern ice from drifting farther south than the main Digges Islands. A further advantage of the sound is that it considerably shortens the distance from the sea to places on the eastern side of Hudson Bay and to Musoni in James Bay. The newly charted channel is wildly picturesque. At the eastern entrance to the sound, on the mainland side, stands Cape Wolstenholme, a great rock promontory whose perpendicular walls rise nearly 1000 feet from the water's edge. From this great headland the sound is walled for several miles by stupendous cliffs. Hudson Strait possesses a wealth of magnificent cliffs but nowhere do they rival in rugged grandeur the cliffs of Wolstenholme. Greatly weathered by the action of the elements these sheer rock walls have assumed the shape and sombre grey of old cathedral ruins. Thousands of guillemots and murres come yearly to these cliffs to breed, and in the summer months the place is alive with the clamour of these sprightly little sea birds. At the turn of Digges Island Sound and 15 miles from Wolstenholme the mainland coast is much broken by inlets. In Ivugivik, the easternmost of these sea incursions, is a large Eskimo settlement. Ships can obtain good anchorage here in shelter from all winds except those from the north to which direction the inlet is quite exposed. Immediately westward of here is Nuvuk Harbour, where a long and very narrow fjord pierces the coast. This inlet is forked and good-sized streams flow in at the extremities of the arms. The water is deep and here schooners and small vessels can obtain perfect shelter. Larger vessels can anchor at the mouth of the inlet to shelter from north-east winds. With winds from other directions a good anchorage is under the lee of some large islands about $2\frac{1}{2}$ miles south-westward of the entrance to the narrow fjord.

On October 2 the patrol vessel steamed through the newly charted Digges Island Sound and the navigation officers were impressed with its ease of navigation. According to the natives this was the first ship to pass through this sound. As heavy fall weather had now definitely set in it was decided to discontinue charting operations from Digges Harbour and instead to carry on general hydrographic work from the ship. Accordingly we left the locality on October 6 and proceeded to Sugluk where a triangulation was commenced to connect up with our 1932 station on Cape Weggs. A continual series of gales however prevented much progress and on October 14 we took advantage of a trip to Nottingham Island to run a line of soundings for chart use. This completed this year's hydrographic work in the strait and the ship shortly after headed south, arriving in Quebec again on November 1. It might be

remarked here that this was the eighth consecutive season in which hydrographic operations have been conducted on the Hudson Bay Route. With this year's charting of the Digges Islands vicinity there is now available a series of large-scale charts, complete sailing directions and tidal information covering the most important parts of the route. From a personal standpoint the work has been full of interest and such highlights as the survey of south-eastern Baffin Island, the discovery of the reversing falls, the finding of the wreckage of explorer Hall's barque, and the locating of Digges Island Sound have added zest to the charting of this great Empire Route.

TRANSPORT ON THE RIVER SHIRE, NYASALAND

SIR ALFRED SHARPE

Only a few days before his death Sir Alfred Sharpe had sent us the following important remarks on the present condition and the past history of the Shire river navigation. We are fortunate in being thus able to show his continued activity and interest in the country which owes so much to his talents, as is recorded elsewhere in this number.—ED. *G.J.*

IN the *Journal* for November appeared a paper by Mr. G. L. Gamlen under the above heading, together with an introductory note by the Editor, *Geogr. J.* I think it is advisable to place further facts on record concerning the periodical rises and falls in the level of Lake Nyasa, and the consequent variations in the navigability of the Shire river, which is the drain-pipe for the lake.

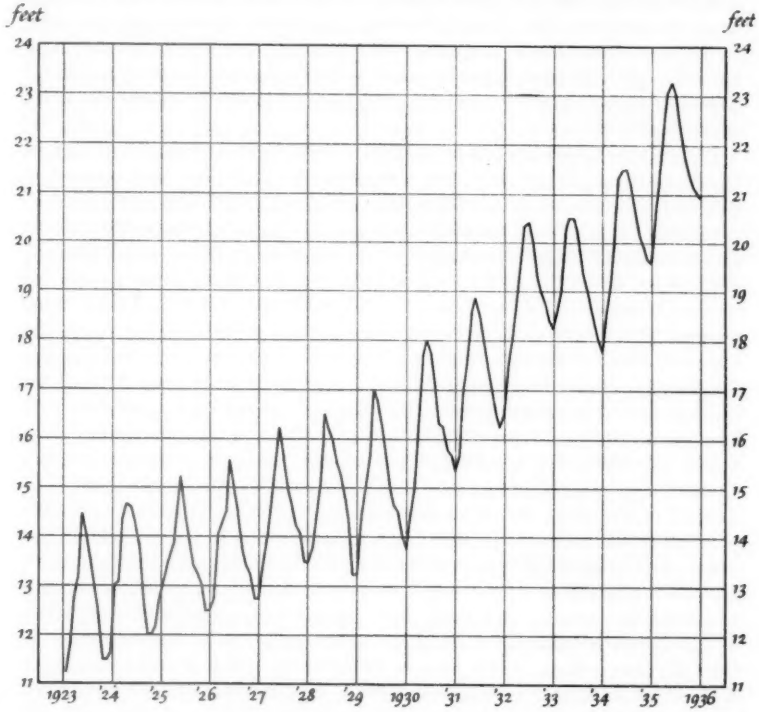
In the introductory note the Editor states, "the recent opening of through railway communication with Beira by the lower Zambezi bridge has made the state of the Shire no longer of more than historic interest."

The extension of the Nyasaland Railways to Lake Nyasa does not however tap the country bordering on the Upper Shire River, nor the extreme southern shores of Lake Nyasa, as the railway, after crossing the Upper Shire by the bridge at Mpimbi leaves the Shire valley and goes inland to Balakas and beyond.

The Upper Shire, the country surrounding Lake Pamalombe, Fort Johnston, Mpondas, and the south-east arm of Lake Nyasa are agriculturally rich districts, peopled by a progressive Muhammadan population, and are capable of much development. Formerly, in the 'eighties and 'nineties, transport to and from these districts was carried on by steamers which were able both to serve lake ports and to descend the Shire to Matope. This became more and more difficult owing to the lessening depth of water in the river, and finally quite impossible when the flow of water totally ceased.

At the present date however the Upper Shire River, which has been gradually increasing its depth for the last twenty years or thereabouts, is becoming available again for navigation. Lake Nyasa has cycles of rise and fall in level. As far as we can judge from such records as have been kept, the last high peak of level of Lake Nyasa, and consequently the Shire River, must have been somewhere about 1878 or 1879, at which date during the dry season

there must have been something like 8 feet in depth right down to Matope. When I first went to Nyasaland in 1887 the steamers navigating the lake could still descend the Shire River to Matope, the depth in the lowest part of the river (at Liwonde) being 6 feet. At that time however the level of water in Lake Nyasa was slowly falling. The date when Nyasa Lake was at its lowest was about 1914 or 1915, since when it has been gradually rising. To-day the state of the Shire River, so far from being no longer of more than historic interest, is a matter very interesting to the Nyasa Government, which is



desirous of making use of the Shire once more for transport of the products of the Upper Shire Valley and the southernmost shores of Lake Nyasa.

Dealing with the "deterioration in the channel of the Shire," Mr. Gamlen has supplied a graph which shows clearly the rises and falls in Lake Nyasa from the year 1896 to 1930. I enclose a graph which has been compiled by Mr. Reginald Sharpe from the measurements taken very carefully year by year at Fort Johnston by Mr. Chamberlain. These measurements have been taken monthly, on the 6th of the month. From this it will be seen that the high peak every year is about the month of May, the lowest levels being in November. The annual *seasonal* difference is round about 3 feet. Since 1923 the total rise in level of Lake Nyasa is just 9 feet, all these levels having been

taken monthly on the 6th of each month. The rise this past year, that is from May 1934 to May 1935, was 1 foot 8 inches. The lowest level on 6 November 1935 was 1 foot 3 inches higher than the lowest level on 6 November 1934. It is practically certain therefore that the high level next May (May 1936) will be at least 1 foot higher than the high level in May 1935. Already in May 1935 the settlement of Fort Johnston on the Upper Shire River had become almost an island, and the lowland surrounding it had been flooded by water from the lake. This year the main road connecting Fort Johnston with the south will have to be taken much farther inland along the foothills to the west in order to avoid being flooded. Various theories have been put forward to account for these periodical rises and falls in the level of Lake Nyasa. Some people have thought that there must be some subterranean movements, and so on. My own opinion has always been that the cause is a perfectly natural one, being as follows:

Lake Nyasa has of course only one outlet, that is at the extreme south end, by the Shire River. When that river is running full bore from bank to bank, it is taking more water out of the lake than the lake can afford to lose, the result being that the lake level gradually falls year by year until eventually the exit gets so low that floating vegetation, cabbage weed, reeds, and all sorts of floating stuff blown down the lake by the northerly winds, collects across the exit (generally known as the Fort Johnston Bar) and forms a complete block. What happens then is that reeds take root, more drifting material accumulates, and gradually that bar becomes higher and stronger year by year. The result of the stoppage of all outflow from the lake is that the channel of the Shire River and the bed of Lake Pamalombe grows up, is covered with vegetation, and becomes an additional block which prevents all exit of water down the Shire Valley. Meantime the lake, having lost all exit, begins to gradually rise, but it takes many years before it can rise to a sufficient level to force out from the channel of the Shire River all this vast amount of accumulated vegetable growth. What makes the process more difficult moreover is that one or two rivers which enter the Shire south of Lake Pamalombe during the flood seasons have been pouring in all sorts of accumulated vegetation, gravel, sand, and occasional tree trunks, and these have formed bars across the river, all of which have to be gradually scoured out and carried away by the current of the Shire River as it rises. At the present date there is plenty of water from Lake Nyasa down to Liwonde where during the dry period a causeway has been built across the river to carry a road, which helps to hold up the water above. This of course will before long be carried away by the constantly rising level of Nyasa and increasing current in the Shire River. It is probable that before many years have passed navigation between Lake Nyasa and Mpimbi will be resumed. Already so much material has been scoured out by the increasing current that very little work is needed to clear a free course from the lake to Liwonde, with a minimum depth of over 6 feet. A ridge of rocks crosses the Shire River at Liwonde. Probably this at some prehistoric period was the southern limit of the south-east arm of Lake Nyasa.

Mr. Gamlen states: "it becomes clear that the bed of the Shire has been and is continually rising, which is the main cause of its ceasing to be navigable." This is a somewhat misleading statement. From 1910 or thereabouts till

some date round about 1920 the bed of the Shire may be said to have been "rising" in the sense that it was gradually being filled up by deposited material and vegetation; but in the same sense it may be said, since 1920 or thereabouts, to have been "falling" owing to the deposited material being gradually scoured out by the increasing current and volume passing down the river. It only needs another two years' rise in the level of Lake Nyasa, with an increase of 2 feet in the level of the Shire River, to provide a volume and pressure of water sufficient to sweep and scour out the whole Shire bed down to Liwonde and probably to Mpimbi and Matope. Consider for a moment the enormous force represented by an increase in depth of 10 or 11 feet in a body of water 360 miles long by 30 wide, discharging by a channel 100 yards wide!

I do not quite understand Mr. Gamlen's stated opinion that "the accelerated rising of the river bed has been caused by the increase in the population since the advent of the European which has necessitated the cultivation of large areas of land and the wholesale denudation of the country of the forest has followed, etc."

As far as my knowledge goes, from 1887 to the present date, there has been no noticeable increase in population in the upper Shire valley. There is an increase round the shores of Pamalombe, and in the districts bordering on Fort Johnston and the south-east arm of Lake Nyasa, all flat country without any "forest." I cannot agree with Mr. Gamlen's opinion that "the cost of opening this waterway (the upper Shire River) for navigation would be prohibitive; further the cost of keeping the channel clear would be far from slight, and now, since the railway connects with the lake the necessity has also disappeared. In view of these facts it may be safely assumed that the upper Shire will never again play a part in the transport system of Nyasaland."

On the other hand, I have no hesitation in saying that within two years' time the Upper Shire will again be playing a very useful part in Nyasaland's transport system, providing a very cheap means of transport as a feeder to the railway in tapping districts which are not touched by it. Furthermore that when once the Shire channel is again clear no work will be needed to keep it clear for at least forty years, as was the case in the last "full Shire" period from 1860 to 1900 roughly.

I may be allowed to correct what are, I think, a few errors in Mr. Gamlen's notes on the early history of the river.

Mr. Gamlen states in his paper that the Portuguese, "sailing up the Kwakwa mouth of the Zambezi," were able to reach Sena and Tete. The Kwakwa has never been a mouth of the Zambezi within historic times. Small boats leaving Quilimane were able to ascend the Kwakwa as far as Mopea, from which place goods and passengers were carried overland to Vicente on the left bank of the Zambezi River, where they were again shipped and sent on by water up the Zambezi and Shire Rivers. Mr. Gamlen states that in 1876 the Livingstonia Mission, on the steamer *Ilala* "sailed from Chinde to Katungas." Chinde however was not discovered until 1888. Any vessels entering the Zambezi from the ocean previous to 1888 came by the Conceicao mouth of the Zambezi, which had a very difficult and dangerous bar on which many years ago several sailing vessels were wrecked. The Chinde mouth was discovered by Mr. Rankin.

It is stated also that the *Lady Nyasa* was the first commercial steamer to run between Chinde and Katungas. As already pointed out Chinde was not discovered till 1888. The *Lady Nyasa* used to run chiefly from Vicente to Katungas. It is stated that in July 1891 the gunboats *Herald* and *Mosquito* sailed up the Zambezi and Shire rivers with Sir Harry Johnston; from which it might be implied that these two gunboats had entered the Zambezi from the ocean. This was not the case. They were stern-wheel boats and were built at Chinde.

It is stated that the Island of Inyangoma is formed by the Zambezi breaking through at Mutarara, and that flood water of the Zambezi flows down the Ziu-Ziu and joins the Shire, etc., etc. The Ziu-Ziu sometimes runs from the Zambezi to the Shire, at other times from the Shire to the Zambezi, it depends upon whether the seasonal flood water come down first in the Shire or in the Zambezi. When the cyclone occurred at Chinde in February 1932 that port was not "demolished," though a great deal of damage was done to buildings and to shipping. Fortunately the Trans-Zambezia Railway was at the time just completed, but the port of Chinde is still used, chiefly for the shipping of sugar from the Zambezi Delta. The river steamers formerly used on the Zambezi and Shire rivers have been largely employed since the completion of the Trans-Zambezia Railway in carrying on transport from Tete, the chief export from that place being coal, of which at present some 12,000 tons are sent down the Zambezi annually.

THE EARTH SCULPTURE LABORATORY

PROFESSOR ALAN G. OGILVIE

THE removal of the Department of Geography of the University of Edinburgh into greatly enlarged quarters in 1931 gave the opportunity of carrying out a long cherished hope of providing a laboratory in which the natural processes due to flowing water and to wave action could be imitated. Since the establishment of this laboratory many visitors from other universities have displayed a keen interest in it; a brief description of the simple apparatus and its uses may therefore prove useful to other workers in the field of physical geography and especially to teachers.

So far as could be ascertained by inquiry in this and other countries the only apparatus of the kind previously devised, apart from troughs used solely for studying river load, was the narrow tank in the so-called "wet laboratory" of the Geological Department of the Ohio State University, where Hubbard and Smith had studied river work and delta formation.[1] The Edinburgh equipment therefore had to be made without much aid from the experience of others, but so far, save in one respect, it has given all the satisfaction that was looked for. It was required to illustrate the work of rainwash, rivers, and waves, and it does in fact reproduce well the two latter phenomena. But so far, the difficulty of producing the very fine spray that should represent rain on the laboratory scale has not been overcome, partly owing to the lack of height in the room available.

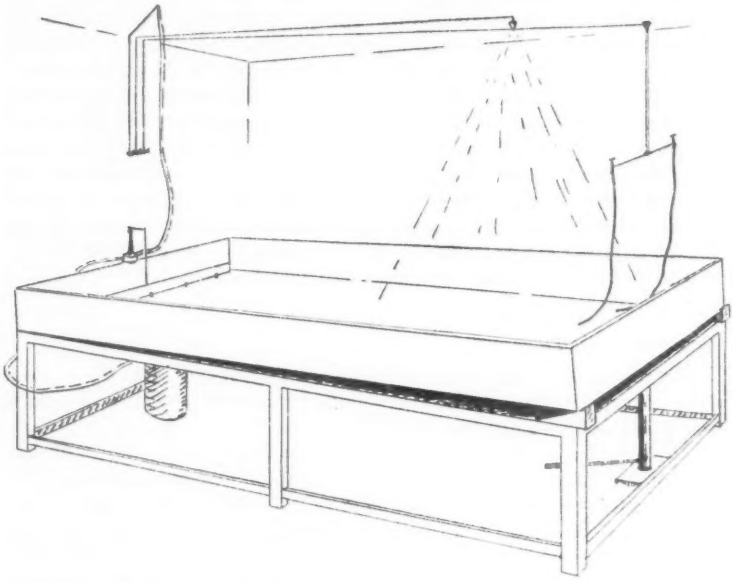
Equipment of the Laboratory

The apparatus consists of an oblong box, 8 × 5 feet and 1 foot deep (inside measurements) made of 1½-inch boards strengthened underneath by T-shaped iron girders and mounted on a frame of 2 × 3-inch wood supported by six legs, 26 × 3 × 4 inches, with ties 2 × 3 inches. This box is lined with sheet lead $\frac{3}{32}$ inch thick, and so forms the tank. Its dimensions were determined by the space available and by the considerable weight which it has to bear during experiments. Since the load of silt and water together with the sheet lead weighs some 9 cwt., the flat bottom had to be well supported. This box is hinged below at one end, and beneath the other end is a "Skyhi" hydraulic jack bearing on the lower edge of the box. The tank may thus be tilted to any desired slope towards the outlet end; but as the jack is placed centrally, wedges are inserted at the sides for safety. The outlet is a 1-inch circular hole in the bottom placed centrally near the hinged end and fitted with a brass sleeve which by vertical movement allows overflow of water at any desired level. When the wave machine is in action this is replaced by a plug. The outfall is connected to an earthenware trap below the tank which prevents silt from reaching the drain.

Water is led by separate ½-inch pipes to three positions on the ceiling over the tank. From the first, over the end above the jack, two rubber tubes with separate taps provide movable sources of "rivers." These might be more

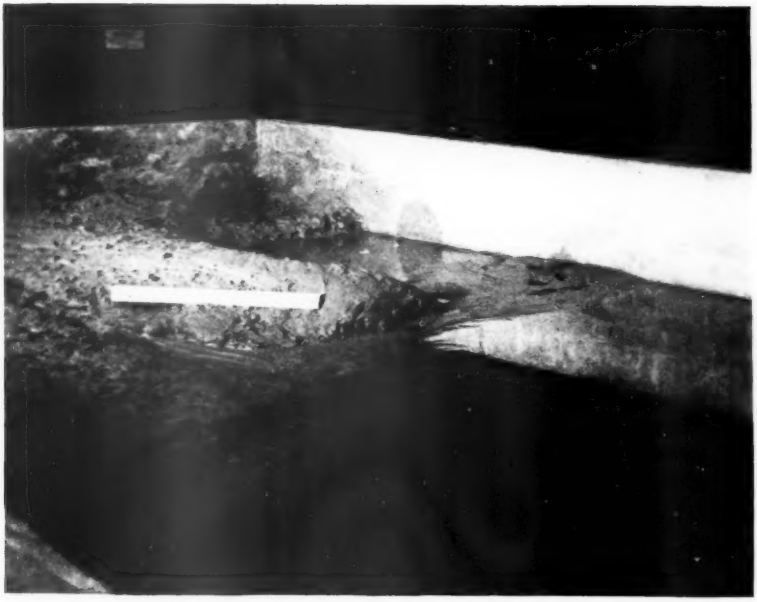
[1] G. D. Hubbard, "Experimental Physiography," *Bull. Amer. Geo. Soc.* 39, 1907, 658–666. Smith, A. L., "Delta experiments," *idem*, 41, 1909, 729–742.

numerous of course but two are found to suffice in a model of this size. The second, placed above the long axis of the tank but nearer the "jack end," terminates in a brass nozzle, 70 inches above the tank bottom, from which is sprayed a cone of fine drops of water. Most of this is distributed over about half the area of the tank; but as some of the water strikes beyond the rim, shields of sheet zinc are usually erected, resting on brackets on three sides to keep the floor, and the observers, dry. This water cone is the rainfall. As such it is quite unnaturally heavy; but the coarseness of the silt which it erodes will be seen to compensate for this defect when the scale of the land model is considered; for the grains of even the finest silt would correspond to boulders in Nature. A more serious defect is the uneven distribution of the "rain"—

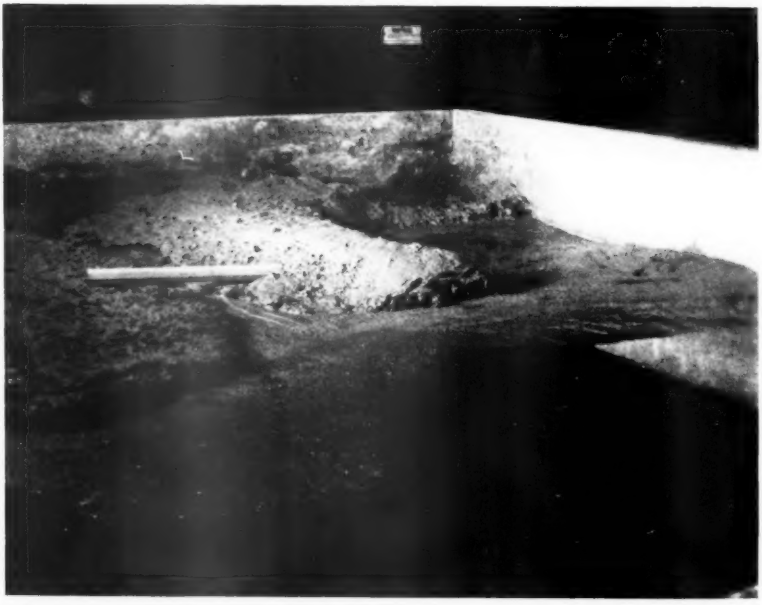


with a central circle of lighter fall surrounded by a ring of very heavy rain about 1 foot in width. I hope however that a more satisfactory spray will be devised, perhaps with the help of a small motor.

Over the "outlet end" the third pipe, prolonged downwards from the ceiling by a 1-inch pipe of strong rubber, is connected to a water-driven turbine, enclosed in a cylindrical case 4 inches in diameter which is clamped on the rim of the tank. The employment of the turbine and of the attachment to be described has solved the difficulty of producing suitable water waves. The wave-maker is a light plate of rigid metal nearly as long as the tank is wide and 4 inches broad. It rests in V-shaped brass studs, which should be at least five in number to prevent bending. These studs set on the tank floor act as hinges for the plate. A metal rod fixed rigidly to the centre of the plate rises as high as the vertical spindle of the turbine (*i.e.* 19 inches). To this it is linked



Embayed coast after attainment of maturity, with coves and stacks on headlands; the farther bay converted to a lagoon by formation of hooked spits. (The troughside is reflected in the water)



Mature coast with water surface lowered to show abrasion platform and back structures

River flowing on a plateau just after its capture (in front of trowel) by regressive erosion of a torrent

Rejuvenated river after truncation of an incised meander

by a horizontal arm so made that the rotation of the spindle is transmitted as a horizontal oscillation of the vertical rod. By this motion the plate, when partly submerged, propagates waves "up" the tank, their period depending on the pressure of water in the turbine, which is regulated by a tap. A rubber pipe acts as outfall from the turbine.

Water Supply

It will be seen that, water being the active agent, the successful manipulation of its supply is of great importance. A good head of water at a regular pressure is desirable. The maximum pressure must be sufficient to drive the rain spray through the nozzle, while regularity is most important in operating the small turbine. Thus water from an independent cistern high above the laboratory is most satisfactory, since pressure on a main supply is apt to vary, with a marked increase at night.

The Solid Material

No less important for the success of the experiments is the nature of the material upon which the water is to work. It must be of uniform and fine texture and of a tenacity suited to the water movement. It seemed likely that loess might prove the best material; but for obvious reasons this was not available. At the time of the installation however a new city sewer was under construction in a bed of lake silt of Quaternary age, and from this excavation apparently fine silt was procured. Nevertheless prolonged washing under the spray and redeposit were required before all the coarser material was eliminated by hand picking. Then the forms built of the silt were found to disintegrate too quickly, so a supply of pot clay was procured and gradually mixed with it by hand rolling. This mixture proved satisfactory. Incidentally it may be mentioned that pure clay is useless, since tap water has no erosive effect upon it. But by feeding fine sharp sand into a stream running on pure clay, interesting river beds may be carved. We still want however a good method of giving the stream an automatic supply of sand.

The experiment of imparting a "rock structure" to the modelled land has been tried by using materials of varying proportions of clay and silt; and this might well be pursued further. These experiments demonstrated that the "rock" differences should be slight. A stratum of pure clay overlying pure silt, for instance, was immediately undercut without being itself eroded.

Uses of the Apparatus

Rain Wash.—Despite the unnaturally heavy character of the "rain" provided the experiments have been interesting in several ways, although as adjuncts to teaching rather than as means of serious study. In the first place they yield instructive illustrations of soil washing and "erosion pavement"; minute pebbles in the finer silt accumulate on the surface and in time they remain as caps of miniature earth pillars. Land of any initial form is quickly altered, first by sheet flood and later by large numbers of streams. Thus the development of drainage systems may be observed. Moreover with a little care in the building of the initial model quite recognizable copies of the aggraded plains of the desert are evolved so that they gradually bury the lower

hill slopes, as in Nature. No matter what form the original model may have, its hill features are ultimately worn down under the rain wash and the final landscape is one of very low relief due partly to erosion and partly to deposit. Again, it is possible to demonstrate river capture dramatically. For this purpose a river is given a gentle gradient on a course traversing the heavy rain zone which is made partly to coincide with a steep scarp overlooking a lake, the scarp summit being not far from part of the river. The rain-made gullies which form on the scarp quickly cut back, and one of them is certain eventually to capture the river.

River Work.—The most obvious uses of river experiments as adjuncts to the more elementary teaching are perhaps the demonstration of regressive erosion, the formation of deltas and the character of meanders. Regarding the first phenomenon, experience has repeatedly revealed the difficulty of convincing some students when only diagrams were available in illustration. Such people need only five minutes' observation to be satisfied. Base level can be lowered at will—by means of the sleeve pipe in the standing water, whereupon rapids form on each river at its mouth and immediately recede upstream. Repeat the operation and a second rapid follows the first—and so on. The formation of river terraces, following upon the lowering of the base level, is always interesting.

Deltas of various forms can be produced; and here the American experiments referred to may be used. Moreover the "lake" can be maintained still, save for the river's own action, or a definite set can be given to its current from another jet. Again, the delta may be modified by lake waves, while sections, later cut through the emerged delta, show the bedding of deposition.

Meanders, for teaching purposes, are almost necessarily started artificially. But their subsequent development can safely be left to the river. It always mimics Nature satisfactorily, as to erosion and deposition; the downstream migration of meanders and the occasional truncation of one of them are faithfully reproduced. So far, the attempts to produce free meanders without manual aid have not met with success. This is probably due partly to the character of the load and partly to the difficulty of maintaining flow in a continuous channel over a slope gentle enough to induce lateral swing of the current.

In this and many other experiments one is faced with a difficulty due to the porous nature of the material. For most experiments the "lower" part of the tank is under standing water, and consequently, no matter what the form of the surface is, the water table on the "land areas" is everywhere virtually at the surface. The silt "hills" are therefore water-logged and when touched by hand behave like quaking jelly; yet they do not lose their shape by sagging.

Waves and Currents.—Of the various phenomena illustrated in this laboratory those of shore-line development are probably the most realistically presented. The weakness of the water-sodden material is here no disadvantage; it merely serves to facilitate erosion. It must however be recognized that the waves are not true to Nature. Their amplitude is too great and yet they do not break, their size being too small to overcome the surface tension of the water. Nevertheless in the general effect of their action a very close resemblance to the real thing is obtained in a very short time. When waves are set to work

upon an initial shore-line of submergence a line of cliffs is quickly formed; in height these are soon seen to bear a direct relationship to the angle of wave incidence, and the same is true of the width of the abrasion platform. Slight differences of texture cause the formation of very natural coves and stacks. Abraded material is partly pulled down to be built into the shore-face terrace, but most is transported along shore to be deposited in slacker water wherever the coastal form provides this. In these experiments benefit is derived from the happy accident that the glacial lake silt of Lothian contains fine coal dust as its lightest component, and the movement of this is of course easy to observe.

Off-shore bars are thrown up on the abrasion platform and then gradually prolonged in the direction of transport. Currents of somewhat exaggerated velocity are set up in narrows, and illustrate the effect of scour. Bay heads are filled in or truncated by bay bars. By careful modelling of the initial coast the water can be made to reproduce rather closely an actual shore-line which will resemble that of the map most nearly at a certain time, and then as the process proceeds the features will gradually assume a greater smoothness in plan. When the water is drained off the silt formerly submerged forms a surface crust which preserves the submarine features. By cutting vertical sections these may be studied in profile. If the water level be lowered raised beaches are of course revealed, and these may subsequently be undermined by the lower waves. Emergence can be effected either by dropping the water surface or by tilting the tank slightly. The comparison of the results obtained after each method has been applied is likely to be a fruitful one, since coasts due respectively to eustatic change and to crustal deformation are thus shown in miniature.

I am indebted to Mr. D. L. Linton, M.SC., Lecturer in the Department, for help in devising uses for the apparatus, for suggestions relating to its description, and for the photographs. I owe the design of the wave-maker to a former pupil, Dr. Ronald Miller.

HISTORY OF CARTOGRAPHY

CARTOGRAFIA E CARTOGRAFOS PORTUGUESES DOS SÉCULOS XV e XVI. By ARMANDO CORTESÃO. *Lisboa: "Seara Nova"* 1935. Two volumes. $11\frac{1}{2} \times 8$ *inches; vol. I*, xliv + 390 *pages; vol. II*, 454 *pages; facsimile maps.* £1 15*s*

IT is hardly too much to say that this is one of the most important works of a special character dealing with the history of old maps that have appeared within recent years. While many such studies have been concerned merely with isolated episodes or miscellaneous items, it possesses the advantage both of unity of aim, and of a field wide enough to form no insignificant part of the whole history of map-making. By taking as his theme the work of his own nation only, and this in the periods of its rise, culmination and incipient decline, Dr. Cortesão has been able to present an unusually complete picture, and one can but admire the industry which has put at his call the whole body of previous research, not only on Portuguese maps, but on contemporary work of other nations which has a bearing on his subject. He has exceptional qualifications for the task, for starting as a practical surveyor in West Africa he in time took a leading part in the administration of the Portuguese colonies and became deeply interested in their history, with which the maps dealt with have been so intimately connected.

In a review like the present it is possible to touch upon a few only of the many interesting points which emerge from a study of the book. It begins with a general survey of the field, afterwards taking in turn the successive stages of Portuguese map-making in the fifteenth and sixteenth centuries. The arrangement is mainly chronological, though the work of outstanding groups or persons like the Reinels, Homems, and Vaz Dourado is wisely dealt with as a whole before that of their lesser contemporaries is summarized. A valuable feature is the very full conspectus of contents given at the outset, the relevant sections being repeated not only at the head of each chapter but of each main subdivision of the chapters, making it easy to grasp beforehand the main drift of the argument. Another example of the thoroughness which marks the whole work is the care with which the full titles of the many works quoted are recorded.

After touching upon the general characteristics of early map-making, and showing how, with the development of Portuguese ocean navigation, primacy in chart-making passed to that nation from the Italians and Catalans, Dr. Cortesão gives a systematic summary of all the Portuguese maps of the two centuries in question—signed or anonymous, dated or undated—which have survived or are known to have once existed, including some of which Portuguese authorship is a bare possibility, or of which Portuguese inspiration at least is to be assumed. While the number to be credited to the fifteenth century is very limited—only sixteen of all categories—the comparative wealth of the sixteenth is well brought out. At least forty-five Portuguese map-makers at work before 1600 are known, the number of separate maps reaching the respectable total of 193, of which 149 still survive. Comparatively few are to be found in Portugal, and this is attributed in part to the destruction wrought by the great earthquake. The list given is not claimed as complete, for lost maps may in time be unearthed, though many are no doubt past recovery.

Of the four main periods defined, the first is that beginning with Prince Henry and culminating in the work of Pedro Nunes. The old controversy whether the introduction of the "carta plana quadrada," as an improvement on the charts previously in use, is to be attributed to the Prince, is fully discussed, and

the author shows that the conflict of views (which has persisted down to the present day) has been due to a failure to distinguish between "square" and merely "rectangular" plane-charts. It was only when the equator was reached that the latter form, known from the days of Marinus, where no uniform relation was maintained between degrees of latitude and longitude, gave place to that in which both alike were made equal to the equatorial degree; and it is these last whose adoption is credited to Prince Henry. However this may be, the lead taken by the Portuguese school under Pedro Nunes has been fully recognized of late years outside his own country, and the claims here made for it can hardly be thought excessive.

Before coming to the next great period, Dr. Cortesão treats of a number of maps, known or reported, which form a somewhat miscellaneous series, and this character is reflected in the rather disconnected method of discussion. Special items are the great map of Fra Mauro, Behaim's globe, the maps associated with the names Cantino and Canerio, as well as the printed work of Waldseemüller; and the general dependence of most map-makers of the time on Portuguese sources is justly insisted on. The problems presented are carefully discussed, including that of the confused reference in the Introduction to the Ptolemy of 1513 to the "Admiral's Map," which has never been explained quite satisfactorily. Dr. Cortesão thinks that the "Admiral" was Portuguese, the mistake in the reference to "Fernando, King of Portugal" lying in the name assigned to the King rather than to the country. While treating of the Cantino and Canerio maps he supplies for the first time a useful transcript of all the legends on both. As to the date of the second he accepts the view of another recent writer that it should be put down as 1505–06 instead of 1502.

Many readers will open their eyes at seeing the heading of Chapter IV, which treats of Christopher and Bartholomew Columbus as cartographers; wondering what they can have to do with the history of Portuguese maps. As some recent writers of that nation have claimed the Admiral as a countryman Dr. Cortesão, in his passion for completeness, has felt bound to enter into the whole question of the nationality of Columbus, and he seems to have read, and digested, most of the vast literature of the subject. He is cautious to pronounce no definite opinion, but while admitting the fantastic character of many of the theories put forward he thinks others may be worthy of consideration, *e.g.* that which would explain the passage of Columbus from Portugal to Spain as the outcome of a special mission entrusted to him by the Portuguese king. It may be convenient to have such a summary of the question, but one feels that this chapter tends to overweight a book which anyhow makes rather solid reading. It may however be worth noting that like so many others, he rejects the theory of La Roncière that the World-map in the Bibliothèque Nationale was a work of Columbus, holding that the date must be at least as late as 1499. Nor does he agree with the view of a Portuguese expert that it is to be attributed to one of the Reinels, though it may quite well be Portuguese. He also thinks that too much has been made of the Turkish map of Piri Re'is, though a map of Columbus may have been used by its author.[1]

With Chapter V begins what may be regarded as the most valuable part of the book, dealing with the heyday of Portuguese map-making, as practised by the Reinels and Homems. Little has been known of the inner history of their activities, and the author found wide scope for original research in this direction

[1] Dr. Cortesão does not seem to have noticed the resemblance, in regard to the South Atlantic, between the Turkish map and that of Lopo Homem of 1519, due no doubt to the use by Piri of Portuguese sources.

in the Portuguese Archives. If only partially successful, he has added appreciably to the information given by writers like Sousa Viterbo, Denucé, and Caraci. Even before 1500 bearers of the name Reinel were in the Royal service in West Africa, among them Pedro, founder of the school of cartography. It is still difficult to appraise the part which he took in the preparations for Magellan's voyage, which Denucé thought to have had an official character. The present author doubts this, but thinks that Jorge, who went to Seville in 1519 as a fugitive (followed later by his father Pedro) probably supplied maps by a private arrangement with Magellan or Faleiro. The attempts of Spain to seduce the Reinels from the Portuguese interest—in 1524, not 1522 as Herrera wrongly supposed—seem to have led to nothing definite. Turning to the output—known or presumed—of the father and son, Dr. Cortesão carefully describes each map and is at pains to unravel doubtful points of date and authorship by a study of their style and nomenclature, comparing the latter in detail with that of other maps of the period. He puts the earliest example, signed by Pedro, as of about 1502, though possibly a little later than the Cantino map of that year. The map at Florence signed Reinel only is put down to Jorge, and placed somewhat later than the Viegas map of 1534. The fine Munich map of Jorge (the legends on which are reproduced and translated) is thought to have been made at Seville in 1519. The unsigned map and charts, now in the Bibliothèque Nationale, offer most difficult problems. Denucé was no doubt right in attributing them to the Reinels but his date of 1516 is too early: it should be put down as about 1522. Such photographic reproductions as we have had give little idea of the artistic beauty of the maps, and it is highly probable that their illumination was the work of the noted artist Gregorio Lopes, the principal illuminator of the wonderful 'Livro de Horas de D. Manuel.'

The chapter on the Homems is of equal interest and adds much to our previous knowledge, though some of the conclusions have been reached independently by Caraci. A provisional version of this chapter was noticed in the *Journal* for January 1933 (p. 91), so it is not necessary now to enter into much detail. The general conclusions on the personalities and work of the various members of the family are not invalidated by the author's further study. He still accepts the genuineness of Lopo's map of 1519 described in the *Journal* for March 1931, but thinks that it was used later to introduce a series of more detailed special maps. The most important point is perhaps the attribution to Lopo Homem of the unsigned nautical chart at Lisbon, hitherto thought to be the work of the Reinels. Dr. Cortesão now puts this down as of about 1550, or some ten years later than he at first supposed.

The second volume opens with the important personality of Fernão Vaz Dourado, to whom a chapter of 100 pages is devoted, and who is held to be the most notable of all Portuguese cartographers, his work being characterized alike by its extent and thoroughness, and by its ornate workmanship, well seen in the atlas long known to English students from its preservation in the British Museum. As in other cases Dr. Cortesão has given much attention to Dourado's antecedents and life history. Born probably at Goa about 1520 he, like other members of the family, played an adventurous part in Portuguese doings in India, and was wounded at the siege of Diu in 1546. (The legend of his extensive explorations in West Africa, where a river still bears his name, has no foundation.) At Goa he probably received his training, and no doubt came in contact with another worker in the same field—Diogo Botelho Pereira (also born in India) whose career ran on very similar lines. Dr. Cortesão deals with his usual care with each of the seven atlases known or presumed to be from his hand. The earliest bearing a date is that made at Goa in 1568, the latest that of 1580 now at

Munich. (The former is notable as containing the earliest special maps of Ceylon and Japan.) Besides describing the contents of each atlas, the author traces, so far as possible, the vicissitudes to which one or other has been subject, and corrects mistakes of dating, etc., made by previous writers. The specimen of about 1568 in the National Library at Lisbon has not always been attributed to Vaz Dourado but good reason is adduced for accepting his authorship. The same may be said of the unsigned and undated atlas accompanying the 'Livro de Marinharia' in the Palmela library, which there is ground for thinking to be the earliest of the series.

We must pass rapidly over the rest of volume II, which treats of lesser men, by whom however the credit of the nation was upheld in this field throughout the sixteenth century. As Portuguese by birth, the noted map-maker of Seville, Diogo Ribeiro, finds a place, other noteworthy names being Gaspar Viegas, Pero Fernandes, and others, in the first half; Bartholomeu Velho, Lazaro Luis, and Bartholomeu Lasso in the second half of the century. The vexed question of the nationality of the prolific map-maker of Messina, Joan Martines, is fully discussed, and the detailed study of his work is useful, even though he is held to have been a Majorcan. The last chapter deals with the work of the Viconde de Santarem for cartographical history in the first half of last century.

If a criticism of so valuable a work may be permitted it is that the author has tried to put too much into it, and that some of the side issues might have been left for separate discussion. In spite of their intrinsic interest, they stand somewhat in the way of a connected treatment of the main subject. On the other hand Dr. Cortesão nearly always displays a well-balanced judgment, and is not often led into excessive glorification of his countrymen. The copious quotations from other authors are for the most part given as footnotes, and will be useful to those who cannot study the originals, while the very complete index is in line with the general thoroughness. An excellent series of reproductions of important maps closes the work, which is extremely well printed.

The author is at present continuing his researches, and the further data already collected will go far to provide material for a prospective third volume.

E. H.

REVIEWS

EUROPE

THE SPIRIT OF IRELAND. By LYNN DOYLE. *London: B.T.Batsford* 1935. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* viii + 120 *pages; illustrations and map.* 7*s* 6*d*

The Irish novelist and humorist, Lynn Doyle, is well qualified to introduce his country and countrymen to the prospective visitor. An Ulsterman by birth, and long resident in the south, he has gained a thorough insight into the national character which he can communicate pleasantly and yet incisively to his readers. He has also the courage to deal faithfully with shortcomings wherever he meets with them, and to record criticisms which need to be made at this juncture. Occasionally his enthusiasms run away with him, but on the whole the picture he draws is sound and well balanced. As is conveyed by the title, he is more concerned with people than with places; he makes the conventional round tour of the island, even more abbreviated than usual, and thus misses scenes well worth a visit, so that the visitor planning an itinerary must turn to other sources of information. His visit however will be much more profitable if he has read Lynn Doyle first, and enjoyed the many good stories he has to tell.

The numerous illustrations fill in to some extent the topographical gaps of the text. They are however somewhat disappointing, one or two being spoilt by over contrast. G. R. C.

ROMAN BRITAIN. By C. M. FRANZERO. *London: George Allen and Unwin* 1935. $7\frac{1}{2} \times 4\frac{1}{2}$ *inches;* 190 *pages; illustrations.* 5*s*

The theme of this book is the glorification of the old Roman Empire by a display of the remains in its most distant province. The author is an Italian journalist and does not pretend to be an archaeologist: but he tries, not without success, to make the old bones live, scanty though they are compared with the great skeletons of the Continent. This is by no means a complete account of Roman Britain; for example, in the description of the Wall there is no mention of Birdoswald, and the author does not appear to know the remarkable abutment of the bridge over the North Tyne at Chesters. There are numerous inaccuracies. He talks of the Wall surmounting "all the Scottish Pennines," and Northumbrians will not like the title of his frontispiece, "Hadrian's Wall along the Scottish Border." Other mistakes in the titles of the plates are "Regnum" (Porchester) for Portus Magnus, and Bronze "Elm" presumably for Helm. Corstopitum (Corbridge) is spelt "Cortospitum" more than once: "Londonium" should not have been allowed to pass.

The author is horrified at the small amount of money that wealthy England spends on its Roman remains, and especially at the covering-in of wall-foundations that have been excavated with great labour. But once these foundations have been carefully measured, most of them contain very little of artistic value to justify the cost of their upkeep. Exceptionally interesting buildings like the theatre at Verulamium have not been covered in. It is sad to have to rebury artistic work like a tessellated pavement such as that found some years ago in Lipping Wood, Hampshire: but unless a protective building is erected over it and a custodian installed, the work is bound to suffer severe damage from our English weather, not to mention unscrupulous souvenir-hunters.

The author also complains that no attempt is made at reconstruction: but, except on paper, reconstruction is valueless, merely crystallizing the conjectures of one or two professors. We do not want a Roman Carcassonne at Verulamium: there is a sufficient example of one-man reconstruction in the fronts of the

mediaeval cathedral on the adjacent hill. The author's enthusiasm for the Roman Empire and his obvious affection for the English countryside make the book quite readable: but he spoils the first good impression by a last chapter in which he wanders from his subject to make a comparison between the old Roman and modern British empires. The book needs an index, if not a sketch-map.

J. H. R.

A WAYFARER IN IRELAND. By CON O'LEARY. *London: Methuen & Co.* 1935. $7\frac{1}{2} \times 5$ *inches;* x+232 *pages; illustrations and sketch-map.* 7*s* 6*d*

The opening chapter of this book will do much to dispel the doubts and fears of the most hesitant of visitors on this side of the water as to the genuineness of the welcome he or she will receive on the other side: and, even though prejudice may only be temporarily discarded open-minded receptivity cannot fail to be beneficial to both host and visitor.

The Nationalist note is sounded throughout the greater part of the book, sometimes perhaps too stridently for delicate ears, it is true. This is Irish history where a fierce light beats on Strongbow, Poynings' Law, Cromwell, King William, the political adversaries of Parnell, Redmond, and the present order. Turning aside for a moment to economic considerations, we feel that Mr. O'Leary will, at some future date, be able to advocate the cause of sugar-beet at Carlow and Thurles, or have something constructive to say about the Co. Wicklow gold mines, or the Castlecomer anthracite coalfield.

The itinerary followed in the book naturally has the capital city as its starting point. There follow journeys to Dublin County and Kildare, to the Boyne valley, then south to Wicklow, Wexford and Waterford; with an alternate route, another way south, by Kilkenny and Cashel—then on to Cork, Glengariff, Killarney, Kerry, Limerick, and Clare, Galway, Connemara, Longford, and finally, Belfast and the "Six Counties."

Naturally the "Six" and their capital are considered as part of a whole, and, in this last chapter there is the same colourful and expressive writing in which love of the past, admiration of the present, and hope for the future seem to go untainted here by any sort of political or sectarian bias. The chapter is short, and if this means restraint, and the right kind, this is surely all to the good. C. K. C.

UNKNOWN BUCKINGHAMSHIRE. By DONALD MAXWELL. *London: John Lane* 1935. $8\frac{1}{2} \times 6\frac{1}{2}$ *inches;* x+158 *pages; illustrations and sketch-maps.* 8*s* 6*d*

The first thought of many an inhabitant of Buckinghamshire on seeing the title of this book will be that, if there are any unknown spots in this county, they should be allowed to remain so. The author in his preface anticipates such a criticism, which he says he must share with others, and, remarking that this kind of book is not read by trippers and speculative builders, takes the attitude that "the public opinion of the very hikers, ramblers, motorists, and explorers who might indeed injure rural England will undoubtedly be the force that will save it." But has he considered that the right-minded explorer for whom he presumably caters may prefer finding the titbits for himself to being spoon-fed by writers of the "Unknown" and other series? The fact is that Mr. Maxwell is an artist—and we have no quarrel with him as such—while his chapters are merely pegs to hang his pictures on. The contents are described in the sub-title as "being a series of unmethodical explorations of the county illustrated in line and colour by the author." The lack of method takes him to such unknown places as Stoke Poges and Great Marlow—he admits that "Burnham Beeches are almost too well known"—but has mercifully saved from his pen several

scenes that would have attracted his brush. The letterpress in this volume is decidedly thin and at times careless. It looks for instance as if he had written two accounts of Newport Pagnell and meaning to discard one had kept both: the one to have discarded is that containing the sentence, "where the great church of Newport Pagnell rears its stately pinnacles is upon a knoll . . ."

J. H. R.

GREATER LONDON; A Social Geography. By J. F. P. THORNHILL. *London: Christophers* 1935. 8×5 *inches;* xvi+138 *pages; illustrations and maps.* 2*s* 6*d*

This is a school text-book, intended for children studying their own locality within the Greater London area, and the author's aim is to make possible the detailed local study without losing sight of the wider regional setting. On the whole the author is to be complimented on the success he has made of the difficult task of selection from the vast mass of material now available through the publication of the New Survey of the Life and Labour in London and of statistical matter of all sorts. The style is clear and the book is very readable, though the attempt to deal with modern industry, transport, communications, services, housing, town-planning and even employment and wages questions has led to a certain scrappiness of treatment and to a dogmatic criticism which sometimes takes the place of explanation. For example, to write of "the unwillingness of the eastern railway companies to electrify their lines as other suburban companies were electrifying theirs in the early twentieth century" reads like a rebuke on ethical grounds, while to criticize the non-development of a road system north of the Thames estuary without reference to the immense barrier that the estuary presents to communication between north and south London, is to give a false view. The interest that this book, with its clear text and admirable maps and photographs is sure to arouse is all to the good: but it is surely a pity to excite the habit of censure in children, especially on a basis of knowledge so superficial as that dictated by the scope of this small volume, informative as it is.

H. O.

HOCHBULGARIEN. I. Die ländlichen Siedlungen und die baüerliche Wirtschaft. By HERBERT WILHELMY. (Schriften des Geographischen Instituts der Universität Kiel. Edited by O. SCHMIEDER and H. WENZEL. Band IV.) *Kiel* 1935. 9½×6½ *inches;* xii+316 *pages; illustrations and maps.*

This study in cultural geography is a valuable addition to the somewhat scanty geographical literature on Bulgaria. It deals specifically with the rural settlement and rural economy of "Hochbulgarien," but though the author ostensibly confines himself to one natural region only, yet in order to make the evolution of the settlements and of the agriculture intelligible, he has been obliged to deal to some extent with the historical and economic development of the country as a whole. Consequently the work has a rather wider scope than the title implies.

It may here be noted that in spite of containing the capital city of the country and of lying athwart a great European highway, the region in question has been so little treated in English works that there is no English equivalent for the term "Hochbulgarien," though it has been current in German geographical works for many years. This fairly typical piece of "Mittelgebirgslandschaft"—again there is no accepted translation—is defined by Wilhelmy as being bounded by the mountains of the Stara Planina (Balkans) on the north, by those of the Rila-Rhodope on the south, while on the east lies the broad lowland of the Maritsa depression with its Mediterranean influences. The western boundary is not very definite, but on the grounds of cultural differences of long standing it is taken to coincide roughly with the present frontier between Bulgaria and Yugoslavia. The region therefore is centred on Sofia, and consists of a number

of rather high basins with intervening dissected plateaus. As the lowest of these basins is about 2000 feet in height, possibly the term "Bulgarian Uplands" might be applied to the area.

The region, it is claimed, played the role of conserver of the main body of the Bulgarian people and of their characteristic mode of life, in spite of five hundred years of Turkish domination and of considerable Turkish colonization. Both the historical researches of the author and his personal investigations in the Bulgarian Uplands reveal the survival of old pre-Turkish modes of life right down to modern times, though rather paradoxically, it appears that these institutions are Slavonic rather than Bulgarian, and that they had survived the Bulgarian invasion also.

The picture which the author paints of Bulgarian rural life—"this orientalized Balkan culture-landscape" as he calls it—has no counterpart in central or north-west Europe at the present day, and as far as England is concerned one has to go back almost to mediaeval times to find a parallel. For instance, it is only in the present century, particularly since the Great War, that the old open-field system of agriculture and its accompanying compulsory rotation of crops have been given up in most parts of Bulgaria, though they still linger on in some districts. Other features of Bulgarian rural life however have never had any counterparts in England and may be looked upon as peculiar to certain of the Slavonic countries. This is particularly true of the *zadruga*, or patriarchal family living as a single household under one roof, and cultivating a single estate as a common property. The author traces the origin of two of the most characteristic features of Bulgarian rural life to the indirect influence of the *zadruga*, namely, the extreme subdivision of the land on the one hand, and the curious plan-less character of the typical village of the Bulgarian basins on the other. The sub-division of the land has gone so far that it is no uncommon occurrence for a peasant-farmer owning, say, 15 acres of land, to have this area divided into fifteen or more disconnected pieces, scattered haphazard throughout the "parish." For instance, in the village of Madan the 228 families held their land divided into 3,217 strips. In 1921 a government measure was passed to effect a voluntary redistribution of the land, so that each farmer could possess his land in a farm in the English sense of the term. Only about ten parishes have so far taken advantage of this measure. Diagrams of two of these are given, showing the distribution of the strips of land before and after the reorganization.

Government measures have also been taken to improve the Bulgarian villages. These improvements were initiated in 1907 and have met with very consider-able success, some hundreds of villages having been reconditioned or being in process of improvement. Diagrams of three of these villages are given, showing the changes which have been effected. The almost complete lack of plan is very apparent, and though little could be done to remedy this, yet it has been possible to provide a network of streets in place of the infrequent, narrow, and muddy alleys which frequently finished in a dead end. The appearance of the village is also altering owing to the abandonment of the old custom of hiding the houses away in courtyards behind high walls, and the modern houses tend to face directly on to the street with a consequent disappearance of the oriental-looking blind walls by which the lanes were formerly hemmed in on either side.

It is clearly demonstrated in the final chapters that Bulgaria is experiencing to the full the cultural changes which are taking place all over the south-east of the continent. This process might almost be called the Europeanization of Europe. Among the changes now taking place, the author cites the breakdown of the communal life of the *zadruga*, the building of new houses on lines similar to those prevailing in central Europe, the introduction of modern systems of

crop-rotation in place of the old two-field or three-field systems, the introduction of crops new to Bulgaria such as sugar beet and even potatoes, and the increasing use of modern agricultural machinery.

The whole work is very fully documented and every available source appears to have been tapped, though the author emphasizes the difficulties of obtaining manuscripts bearing on the early Bulgarian period and on parts of the Turkish period. As far as research in the field is concerned, a vast weight of evidence is adduced. Indeed, so many examples are given in illustration that the work takes on the nature of an academic thesis, a nature which will appeal to the specialist, though it is less likely to attract the general reader. It seems a pity however that an otherwise excellent work should be marred by a considerable amount of repetition. The material is arranged in such a way that subjects are often treated under two distinct heads. For instance, quite a full description of the *zadruga* system is given in the section on "The Bulgarian Uplands in the Middle Ages," and another very similar description in the section entitled "The Sociology of the Bulgarian Village."

The diagrams illustrating the book form an essential part of the work and special mention should be made of that showing the changes in the sites of villages in the basin of Sofia during Turkish times and more recently. The aeroplane photographs of typical villages and the author's own photographs showing the contrasts between old and new houses in Bulgaria are also most illuminating.

There is no doubt that the book forms one of the most important contributions to Bulgarian geography which have yet appeared. M. R. M.

BEITRÄGE ZUR GEOLOGIE DER WESTLICHEN MEDITERRANGEBIETE. Edited by HANS STILLE. No. 12. Die postvariscische Entwicklung des Kantabro-Asturischen Gebirges (Nordwestspanien). By HERBERT KARRENBERG. (Abh. Ges. Wissensch. Göttingen. Math.-Phys. Klasse. III. Folge, Heft. 11.) *Berlin: Weidmann* 1934. 10×6½ *inches;* vi+104 *pages; diagrams and maps. M.*12

BEITRÄGE ZUR GEOLOGIE DER WESTLICHEN MEDITERRANGEBIETE. Edited by HANS STILLE. No. 13. Der Bau der mittleren Südpyrenäen. By PETER MISCH. (Abh. Ges. Wissensch. Göttingen, Math.-Phys. Klasse. III. Folge, Heft. 12.) *Berlin: Weidmann* 1934. 10×6½ *inches;* vi+168 *pages; illustrations and maps. M.*18

The authors of these two works view their areas in the broad historical perspective now familiar to readers of the earlier numbers of this series, noting the direction and date of successive mountain-building movements, and interpreting these with reference to the palaeogeographical maps which indicate the stages in the historical development.

In this broad perspective, Cantabria is seen to belong essentially to the Castilian Meseta, not to the Pyrenees. The movements which have affected it are not other in kind than those which have affected other parts of the Meseta and of its eastern margin. If its true affinities have been doubted in the past, that has been mainly for want of the suitable Celtiberian paradigm, supplied in recent years by this German school, with which to compare Cantabrian structures. There is good evidence moreover in the Mesozoic trough area of eastern Cantabria, for the important intra-Jurassic movements now taken as diagnostic of a foreland area.

But the Tertiary movements which created the present topography of Cantabria are of the earlier, "Pyrenean," date, not of the later, "Alpine," as elsewhere on the Meseta; and their effect was to join up the Cantabrian High-

lands with the Pyrenees. Besides the arching-up of these highlands which accompanied the in-sinking of the basin of Old Castille, on the old land-mass to the west, the floor of the Cantabrian trough to the east was raised, so that its axis continues now, from Reinosa to Castro de Valnera, the line of the Cantabrian heights, and the gap is spanned between these heights and the Pyrenean outliers. It is the peculiarity, in short, of the Pyrenees that they blend westwards into the foreland, and into a part of the foreland which has itself some distinctive characters.

When we turn to the Southern Pyrenees themselves, we find that their history is characterized by retarded and piecemeal development. Geosynclinal depths, of 1000 metres or over, are not reached anywhere before the Cretaceous, and a continuous geosynclinal trough does not appear before the Eocene. One interesting consequence of this retarded development has been that there is no distinction between the Trias of the Pyrenees, of Celtiberia, and of Cantabria, so that the influence on structure of the saline upper-Trias is discernible, in one degree or another, in all three regions.

In some places the saline Trias behaves virtually as an eruptive rock; in all disturbed areas, it supplies a surface over which shearing or gliding movements are easy; at the same time, it acts as a kind of shock-absorber, so that quite different structures are likely to be developed simultaneously in the rocks respectively overlying and underlying the saline level. The recognition of this latter action and of the resultant complex, for which the name *Stockwerktektonik* has been coined, is the most valuable contribution made by Professor Stille's school to the study of Spanish tectonics. The works now under review are of interest principally from the increased emphasis which they lay on this conditioning influence exercised by the geological materials themselves on the structures into which they enter.

Thus Herr Karrenberg (*12*, pp. 64 ff.) uses as the basis for his division of Cantabria into tectonic provinces the varieties of the *Stockwerktektonik* which arise from the differing stiffness and thickness, from province to province, of the "packets" overlying and underlying the saline level. His division, which is of wide applicability outside Cantabria, deserves to be carefully digested.

On the Pyrenean front, where the forces at work have been very much greater, the influence of the material is seen on a larger scale. Herr Misch draws a fundamental distinction between that part of the front in which, the saline Trias being absent, the Cretaceous limestones are drawn into the tectonics of the axial zone, and that other, more complex, part in which the overlying Cretaceous, separated by shearing along the plane of the saline Trias, has its own structure developed in a line of sierras stretching westwards from the Boumort, while the underlying Permotrias and Palaeozoic, with a quite different structure, form an independent "Nogueras" zone between these sierras and the axial zone. With the dying out westwards of the saline formations, the mediate zone dies out also, and the Cretaceous sierras join the main chain in the Mont Perdu.

So far, good. But it is not clear, not at least to the present reviewer, why this mediate zone should show in the main northward-directed movement, in contrast to the southward-directed movement both of the zone to the south, stratigraphically higher, and of the zone to the north, stratigraphically lower; in other words, why an anomaly should appear just below, and only just below, the level of the mobile formations.

Herr Misch however only mentions casually the zone to the north, confining his study to the South Pyrenees, in the popular sense, although he ought, in strict attention to Professor Stille's views, to have carried it right to the *Narbe*, or tectonic parting, of the chain. The explanation, given by the French

geologists, of the southward-directed movement as arising in an axial zone of few granite injections and, consequently, of greater plasticity is not discussed by him at all.

When the work of Professor Stille's team is under review, the same kind of reservations are always to be made in conclusion, since the time spent by the team in the field seems always insufficient for the detailed work needed to give substance to their broad generalizations. R. A.

SIEDLUNGSGEOGRAPHISCHE UNTERSUCHUNGEN IN NIEDER-ANDALUSIEN. By GEORG NIEMEIER. *Hamburg: Friedrichsen, de Gruyter & Co.* 1935. Hamburgische Universität. Abhandlungen aus dem Gebiet der Auslandskunde. Band 42. $11\frac{1}{2} \times 8$ *inches; 229 pages; illustrations and maps.* 15*Rm.*

Herr Niemeier's first big geographic contribution has been brought out by the Hamburg University. He shows himself specially acute in geographic judgment, and without letting himself be tied by delimitation he has taken the Betic Depression, roughly the Guadalquivir trough, and made an exhaustive study of the cultural landscape within it. As he points out, human geography has hardly been touched in the Peninsula, and therefore it is pleasing that he gives credit to Juan Carandell of Cordoba, who ranks as one of the first human geographers in Spain. English readers are promised a summary of Carandell's work, which consists of a long series of articles on local Andaluz geography. Niemeier has spent a long time in his area; most of his facts are obviously the result of personal observation.

Particular interest attaches to Niemeier's interpretation of the historic factor. He brings out a truth suggested years ago by Carandell, that the concentration of people into large nuclei at wide intervals, so characteristic of Andalucia, came with Arabic influence. It was Arabic culture together with the unsettled years of the Reconquista which set up the present human lay-out. Thus, contrary to common statements regarding site values, considerations of water supply took second place to those of strategic value and proximity to lines of movement. It is not many years, for example, since so important a town as Cadiz, imported its drinking water by boat from the mainland. From the thirteenth century onwards Andalucia showed greater concentration of its people and a loss in total population. Much land reverted to waste. Sporadic attempts were repeatedly made to check this loss by internal colonization. Even to-day agitation for such colonization continues. Carlos III, in the later eighteenth century, was most energetic in efforts of this sort and settled many German peasants upon land which had been abandoned. The effects of those colonies are still noticeable in those areas: fields are small and rectangular, paths straight, nomenclature non-Spanish, and the village plans are geometrical (*vide* La Carlota). Unfortunately Andalucia has repeatedly shown a special power to absorb Nordic peoples. Far from maintaining their envied Teutonic virtues, the colonists soon outdid the Andaluces in Andaluz temperament, so that the psychological effects were quite short-lived.

To classify those nuclei in the south is no easy matter. Niemeier distinguishes villages, town-villages, village-towns, country towns, and towns, according to interests of the inhabitants, uniformity of house types, and degree of concentration about some central street or plaza. While his limits of classification are necessarily elastic, his criteria bring out features of Andaluz settlements that have been hitherto suggested only by untrained observers.

His work does not revolve solely round townplans, nor upon what may be termed cartographic data. Townshapes are not unduly emphasized. Niemeier says that a topographic map is the conventional expression of certain limited

data. The degree to which we may deduce from it truths about the *Siedlungsgeographie* is therefore limited and we may attribute many blatant inaccuracies which have arisen in human geography to want of clear understanding of a map's limitations. Geographical study cannot come solely from the map, and when geographers realize this, the bickering between them and cartographers or geologists will cease. Geographical investigation may not even result in a map, but should, as in Niemeier's work, result in as clear a picture of the four-dimensioned space in which man lives as all the art of word and illustration can devise. Niemeier's new maps and human details are admirably illustrated and we only regret that, as far as English people are concerned, the writing is too frequently in indigestible academic German. Learning should be limpidly expressed.

We need more travellers with the trained perceptive faculty of Herr Niemeier. His book must rank as a wealth of material about Andalucia. Whether others agree with some of his conclusions is quite immaterial until several other observers have worked over the area with equal care. His facts are undeniable, a lasting tribute to the wisdom of sending a trained geographer to travel.

E. H. G. D.

LE LOESS DE LA VALLÉE DU RHÔNE. By SUEN TANG-YUET. (Bibliothèque de l'Institut de Géographie de l'Université de Lyon et des "Etudes Rhodaniennes," sous la direction de André Allix.) *Lyon: Bosc Frères, M. and L. Riou* 1934. 10×6½ *inches;* 162 *pages; illustrations and sketch-maps*

This thesis bears evidence of much patient and methodical work. The author begins with a chapter on the structure of loess based on the examination of specimens obtained from the Rhône valley and from central Europe. In his view it is incorrect to suppose that loess is characterized by the angular nature of its particles of quartz; since he finds them less angular than grains of the same size taken from specimens of river silt and morainic sand. In chapter II he deals with the distribution of loess in the Rhône valley. No trace of the deposit is found between the Swiss frontier and the alluvial plain of the Aine, *i.e.* in that section of the valley where erosion is still going on actively. Below this point the author has scheduled all the major occurrences, mainly in depressions and on slopes on the steep side of the Central Massif, and in low plateau formations to the east of the river. This portion of the book is illustrated very helpfully by a number of sketch-maps and sections and by seventeen photographs of loess exposures and loessic landscapes.

The second part of the thesis is concerned with an examination into the origin of the Rhodanian loess. The homogeneity, fineness and partially deangularized condition of the particles, Dr. Suen finds, indicate a wind, constant but non-violent, as the transporting agent. The constituents, being the most common in the world, can afford no help in determining the origin of loess. The chemical constituents may be altered so greatly, after deposition, that they too are of little aid. He opines that water-borne material is not necessarily excluded as the source of loessic constituents, since but an infinitesimal quantity of lime would be dissolved out of glacial mud by the icy waters, and finds that such mud was probably deposited in sufficient quantities to form an important source of material in addition to that supplied by the moraines.

In Part III the author examines, in two chapters, the morphology of the loess, conditions favourable to its deposition (including sub-loessic topography) and the evolution of relief after its deposition, special attention being paid to morphological features such as gorges and depressions and their relation to the gradual demolition of the deposit.

Finally Mr. Suen touches on the loess landscape as affected by vegetation

and human habitation. It is obvious that in an area like the Rhône trench, where the occurrence of loess deposits are of so sporadic a nature, there can be nothing comparable with the typical loess landscape of China, but an interesting contrast is made between the pastoral Dombes on the impermeable and decalcified loess and the plateau of Feyzin where, on a permeable substratum, the loess appears to have retained the characteristics which here as elsewhere have made it such excellent ploughland. H. O.

GEOLOGIE VON TIROL. By R. v. Klebelsberg. *Berlin: Borntraeger* 1935. 10×6½ *inches;* xii+872 *pages; maps and sections.* *M.*69

This volume, by the Professor of Geology at the University of Innsbruck, provides a comprehensive synthesis of the vast array of material available on the geology of the Tirol. The only previous synthesis on the same area is Blaas's "Geologischer Führer durch die Tiroler und Vorarlberger Alpen," and as this was published over thirty years ago at a time when the geology of the Alps had not yet been reconsidered in the light of the *nappe* theory, it is obvious that the present volume fulfils a long-felt want.

Ignoring the political boundaries, Professor Klebelsberg has taken a segment of the central and eastern Alps from the Alpine foreland on the north to the North-Italian plain on the south, so as to include the neighbouring German and Italian Alps as well as the Austrian Tirol. The whole area, covering some 15,000 square miles, is approximately the same size as Switzerland, and is just about as large as can be treated in detail in a single volume. It is true that the resulting tome is somewhat weighty, both in the literal and figurative senses, but the material is very well arranged for rapid and easy reference. One hundred and twenty-three pages of index are supplemented by a full list of contents, and each chapter is divided by headings and sub-headings. Moreover the actual reading-matter is not so formidable as the 872 pages of the book might suggest, since the author's pious intention of including every reference and every person connected with the geology of the Tirol has been given convenient expression in an introduction and in four appendices which amount between them to 158 pages, so that there remain only 591 pages of text dealing with the geology itself.

The main body of the book is divided into three sections. The first deals with each of the main geological regions in turn, *e.g.* the limestone Alps of the North Tirol, the grauwacke zone, the porphyry plateau of Bolzano, and so on, and an account is given of the stratigraphy, lithological character, fossils, etc., of the rocks. Tectonic questions are also discussed here. The second section deals with the evolution of the relief and landforms of the area, and the third section is devoted mainly to the Ice Age and recent times.

In the first section, though possibly less space is devoted to tectonic theories than might be expected, the essential problem of the geology of the area, namely, the contrast in the structure of the Alps to east and west of the Brenner Pass, is treated at some length. It is pointed out also that the *nappe* theory leaves several weighty facts out of account, as for instance the absence of any root-zone east of the Val Tellina comparable with those of the western Alps. The second and third sections are possibly of more direct interest to geographers. In the second section the author arrives at the conclusion that it is impossible to trace with certainty any erosion surface in the Alps of earlier age than the Middle-Tertiary. In this ancient landscape of relatively soft outlines it is shown that the new cycle of erosion of Late-Tertiary and Early-Quaternary times incised deep valleys. After a brief account of the influence of lithology and structure on relief forms, including a section on karst-formation, the question of the influence of glaciation

on the relief is briefly treated, but the main account of the Ice Age is reserved for the third and last section. This deals primarily with the deposits of the Ice Age and later times, and the position and character of the terrace sediments and old morainic deposits are fully described. It may be noted however that there is no discussion as to how or why the "terrace" sediments were subsequently eroded into terraces, just as in the previous section there is no discussion as to what started the new cycle of erosion in Late-Tertiary times. The section includes a chapter of some twenty pages on the extent and character of the Quaternary ice-sheet at the time of maximum glaciation, which is illustrated by a diagram showing, with great delicacy of drawing, the ridges which stood above the ice, and also giving contour lines for the surface of the ice-sheet. Curiously enough there are no other diagrams illustrating the second and third sections, although they comprise together nearly half the book, and—what is even more important—although they deal mainly with landforms which cannot be appreciated without being seen, either at first hand or through diagrams and photographs. No doubt the forms of the relief are familiar to students in Innsbruck, but it is open to question whether students who are not personally acquainted with the area would be able to visualize merely from a description, say, the great terraces of the Inn valley, the remains of the Mid-Tertiary denudation-surfaces, or the karstic plateaus of parts of the Northern Alps. Some provision of illustrations might well have been made in the place of one or more of the appendices or of some of the minor chapters, which seem to have been included rather to make the treatment exhaustive than because they are essential to a geological description of the area. For instance Appendix III with its biographical details of persons of Tirolese origin who have worked on the geology of the Tirol might possibly have been dispensed with, or possibly the three chapters dealing respectively with calcareous tuff and stalactites, atmospheric dust, and cosmic deposits might have been eliminated.

The more purely geological section is illustrated with two figures in the text and twelve plates in a pocket at the end of the book. One of these plates is a geological map of the Tirol on a scale of 1 : 500,000 which has been reproduced by permission of the Cartographical Institute in Vienna from the magnificent new map published in 1933. The remaining plates mainly show geological sections.

Taken as a whole, this monumental work has been carried out with great completeness and thoroughness, and will prove a most valuable aid to students of Alpine stratigraphy. The author is moreover to be congratulated on producing a reference book which is also easily readable, and the publishers on providing type which is both clear and pleasant. M. R. M.

ASIA

SURVEY OF INDIA: GEODETIC REPORT 1934. Published by order of Brigadier H. J. COUCHMAN, D.S.O., M.C., Surveyor-General. *Dehra Dun, Geodetic Branch Office* 1935. 10×6 *inches;* 142+xxx *pages*+29 *plates and charts.* 5*s* 3*d*

During 1934 the Survey of India measured three base lines, in Baluchistan, near Poona, and in Assam, of lengths 10, 7, and 6½ miles respectively. All were "broken" bases, so that the two parts could be compared trigonometrically when the linear and angular measures were completed. Daily comparisons of the invar wires were made against field standards. The estimated probable error from all sources of uncertainty is regarded as of the order ±1/million; but it is pointed out that it is the error of the *extended* base that matters, and this was assessed

approximately at $\pm 1/500{,}000$ to $\pm 1/600{,}000$. The bases were reduced to sea-level from their estimated spheroidal height, in accordance with the dictum of Sir Sidney Burrard that the apparent height of a mountain should not be lowered by raising its foot; in other words, it is not the geoidal height which is demanded for base correction, otherwise the figure of reference is not fixed. The Poona base showed a practically negligible discordance when compared with the trigonometrical measures of 1862–63—a result proving the excellence of the older Indian triangulation in this region.

India possesses nickel and silica standard metres, with which a 4-metre invar standard bar is compared periodically. A pleasing feature of these last comparisons was that the lengths of two new invar wires, referred to these Indian standards, agreed almost exactly with the lengths supplied from the International Bureau at Sèvres.

Investigations were made to discover the relative accuracy of afternoon, night, morning, and evening measures in triangulation; the results went to show accuracy increasing in the order here shown, morning and evening measures being of equal value. This accords with general experience elsewhere except in Africa and possibly in the Pacific; in the former evening measures are definitely the best. The writer shares the disappointment over night measures, which in Uganda did not fulfil his expectations of freedom from shimmer, though he is in full accord with the conclusion reached in India as to the advisability of meaning morning, evening, and night observations. A statement on p. 19 reads curiously: it seems that a real range of 5 seconds corresponds to an apparent range of $2\frac{1}{2}$ seconds on the $5\frac{1}{2}$-inch Wild.

Levelling of precision was carried to the Siamese frontier; the Pigu and Bihar earthquake areas were also included in the levelling programme. The latter showed apparent shrinkages up to $4\frac{1}{2}$ feet at Bench Marks on structures, but not more than 2·7 feet on embedded marks; there were only four cases of a rise, not exceeding $\frac{1}{3}$ inch. Past levelling over seventy years suggested a steady rise in Bihar, whereas the earthquake appears to indicate a sudden fall; Captain Bomford thinks that this may be due simply to the consolidation of fiercely shaken alluvium. The Survey was able to assure local authorities that the risks of riverain flooding were not likely to be increased by the general change of level.

The gravity campaign was continued from Surat down the Malabar (western) coast to Southern India, Ceylon, the Laccadive and Maldive islands, 5800 miles were traversed by lorry—not without difficulties, as when the Tapti River rose 70 feet in one night. Major Glennie joined H.E.M.S. *Mabahiss*, making visits to the islands, where he reoccupied Basevi's old station at Minicoy and verified, at least qualitatively, the excess of gravity there—a subject of much debate amongst older geodesists. Comparison with other recent measures by Lejay and Meinesz suggests that the adopted value of gravity at Dehra Dun is too low by 10 milligals. The general result of the year's work revealed a deep depression of the geoid in Southern India, extending under Ceylon. Further, a great positive upwarp extends southwards from off Bombay to the Laccadives and Minicoy.

The meridional and longitudinal chains of astronomical stations, about 40 miles apart, surpass anything hitherto attempted on a grand scale in the world. One would like to have space to discuss the results; but as they are still far from complete they may be left till a later year. Meantime they confirm recent dicta that the Pratt-Hayford form of compensation gives no more than a very partial solution of Indian anomalies of gravity and deviation of the vertical, except perhaps in the Himalaya region. From the charts here exhibited the impression cannot be resisted that the terrific thrust from the north which piled

up Tibet and the Himalaya and caused the huge Gangetic downwarp was resisted in some measure by Burrard's Hidden Range, resulting in a marked consolidation there; this resistance was not however sufficient to prevent another downwarp in Southern India, where however the situation becomes more complicated. This great "drive through" had moreover the consequence of setting up flanking consolidations following both the Malabar and Coromandel coasts, along which gravity is now shown to be in excess. Naturally in a heterogeneous crust there must arise local zones of upwarp and downwarp, forming secondaries in the main tectonic structure.

In a Report which contains a mass of instructive matter the reader is almost compelled to seek explanations of the Indian problem; that such is the case is itself a tribute to the interest which these Indian reports arouse. Moreover the volume of work compressed into the year demands no mean tribute from the thoughtful reader. G. T. M.

NANGA PARBAT ADVENTURE: A Himalayan Expedition. Translated from the German of FRITZ BECHTOLD by H. E. G. TYNDALE. *London: John Murray* 1935. 10×7 *inches;* xx+93+80 [*Plates*] *pages; illustrations and sketch-maps.* 10*s* 6*d*

An account of the original German version of this book 'Deutsche am Nanga Parbat,' was given in the *Journal*, vol. 85, p. 267. The present translation has been faithfully done by Mr. Tyndale, who contrives to give the spirit of the original text without following the German too slavishly. It is a very good piece of work. M. C.

SIAM: das Land der Tai. By WILHELM CREDNER. (Bibliothek Länderkundlicher Handbücher. Edited by ALBRECHT PENCK.) *Stuttgart: J. Engelhorns Nachf.* 1935. 9×6 *inches;* xvi+422 *pages; illustrations and maps.* *M.*30 (*unbound M.*27.50)

This is a scientific review of the country based on the author's travels and researches during the period 1927–29. Professor Credner says that Siam may well be proud of her modern improvements, but the main object of his work is not so much to record the process of westernization as to bring to the notice of students, especially young Germans, the great opportunities for research and enterprise which are still to be found among this cultured and interesting tropical people. In proof of this he points out that Siam is still an independent state despite centuries of warfare with neighbouring peoples, and latterly, European attempts to interfere in its internal affairs.

Beginning with a technical survey of the geological formation of the country showing its volcanic origin and great mineral possibilities, the author devotes much study to the climates and their effect on agriculture, with special reference to the cultivation of rice, the growth of teak wood, and other valuable forest products. He points out the remarkable facilities for settlement and transport afforded by the great river systems, and is much impressed with the industry and happiness of the varied peoples to be found on their banks. Nor does he forget to mention the vast areas of unexplored jungle with their interesting flora and fauna.

The work contains a great deal of information regarding the more primitive inhabitants, especially the Semang, Karen, Lao, and Shan tribes, and it goes on to show their connection, with the exception of the Semang who are of ancient Negrito stock, with the main Mongolian or Tai race of Siamese. This chapter alone gives the impression that Siam must be a veritable paradise for anthropologists.

Professor Credner is particularly interested in the position of Siam as a great food-producing country with so many neighbours dependent on her for their rice supplies, and he does not fail to notice the tremendous influence of the Chinese on her agricultural and commercial activities. His itinerary followed in general the main river and railway routes, but he made long expeditions on foot into French and British territory. These journeys included a visit to the celebrated ruins of Angkor. His intensive study of these architectural wonders lead him to shed fresh light on their construction, the life of the Kmer people, and the final annihilation of this remarkable Indian civilization by Chinese invaders in the fourteenth century. He also visited the Lao tribes in French Indo-China and was struck by the apparent poverty of these people under French administration. Finally he made a very strenuous expedition into the Shan States of British Burma where he found the natives sullen and unfriendly, compared with his experiences of the hospitable peoples of Siam Proper.

The author traces the present Siamese, the Tai, from the Lao tribes who originally inhabited the interior of China but were gradually driven south by Chinese political expansion, and he notes their close allegiance with China and everything Chinese to this day. The Buddhist religion, he says, appears to have been acquired when the Tai absorbed the remnants of the Mon-Kmer civilization, and to this day Buddhist priests, recruited from the youth of Siam, retain great influence over the spiritual and cultural welfare of the people. The kings, as heads of this religion, are considered sacred. Nevertheless this fact has not saved them from being deposed when they oppressed their subjects or became too influenced by European advisers.

After mentioning the constant wars with the Burmese and the Annamites, the author dwells on the era of European intervention in the Far East. This commences with the arrival of the Portuguese who attempted, as elsewhere, to convert the Siamese to Christianity. Then came the Dutch who concentrated on obtaining trade concessions. Afterwards the French followed and forcibly occupied large sections of the State until Great Britain, who, through the old East India Company, had acquired a strong advisory position, deprecated further partition of Siam and arranged understandings with France and Siam regarding the southern and eastern frontiers. Other nations, including Germany, are represented in the official and commercial life of the country, especially in connection with the Medical, Post and Telegraph, and Police administration, and he is of opinion that there is still much useful and very necessary work to be done by Europeans even to this day. In support of this view he points out that Siam, being in the position of a buffer state between the two great Powers of England and France, is assured of continued independence and therefore remains an open field for all forms of European assistance, research, and enterprise.

Although there are numerous books in English on Siam, Professor Credner's work is a most valuable addition to the world's information concerning this somewhat obscure corner of Asia. The book is profusely illustrated with excellent photographs of native life and scenery, and his scientific deductions are made extremely clear by plenty of maps, tables, and graphs. W. F. DE V. S.

ECONOMIC GEOGRAPHY OF ASIA. By DANIEL R. BERGSMARK. *New York: Prentice-Hall* 1935. $9\frac{1}{2} \times 6$ *inches;* xxiv + 618 *pages; maps and diagrams.* $5.00

The number of senior text-books dealing with Asia as a whole is still small, and this may be described as the first by an American author. Though shorter, it follows almost exactly the same general plan as the reviewer's own book on Asia,

and of necessity the sources of material are largely identical. The treatment illustrates some of the outstanding differences between the viewpoints of American and British geographers at the present day. The consideration of the physical background is reduced to a minimum, and so is the human aspect. What remains is a well-written, adequately documented, though not always accurate, account of the economic geography, country by country. In some chapters, regional divisions are used, but the emphasis is on political units. Many Asiatic countries are changing with amazing rapidity and it is difficult to publish a volume which shall be up to date when it appears. The author here has experienced the usual difficulty with regard to Russia, and his penultimate chapter on Siberia and Russian Turkistan only occupies twenty-eight pages—two less than that on the Philippines. He has overlooked recent developments in Palestine—the working of the Dead Sea deposits, the remarkable growth of various manufactures, and the growth of Haifa, following the completion of the harbour works. There are some slips, but more serious are facile generalizations such as "throughout India the peasants live in villages of mud huts" or "85 per cent. of India's output of crude petroleum is concentrated in *an area* of a few square miles located about 650 *miles* north of Rangoon in Burma." Indeed, the whole section on India (eighty pages) is far from satisfactory. Sind is treated as a region of inundation canals "of which type the British have made several new ones." The "Bihar and Orissa rice region" curiously excludes both Bihar and Orissa. The Pegu range (omitted from map) is scarcely in northern Burma.

L. D. S.

AFRICA

SLAVES AND IVORY; A Record of Adventure and Exploration among the Abyssinian Slave-Raiders. By Major HENRY DARLEY. First cheap edition; with an introduction by CHARLES W. HOBLEY. *London: H. F. and G. Witherby* 1935 (*originally published in* 1926). $8 \times 5\frac{1}{2}$ *inches;* xvi + 220 *pages; illustrations and sketch-maps.* 7*s* 6*d*

THE REAL ABYSSINIA. By [Colonel] C. F. REY. *London: Seeley Service & Co.* 1935. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 292 *pages; illustrations and maps.* 10*s* 6*d*

These books represent two different approaches to the problems of Abyssinian civilization largely conditioned by the circumstances in which their authors were able to study the country.

Major Darley's observations are of a personal nature. Writing of the country during the time of Menelik he speaks as a trader and a pioneer feeling his way among a little-known people in a part of the world then still considered "off the map." Throughout the time covered by his story his belief in the maliciously exclusive attitude of the Abyssinians towards all white men seems to have been conditioned by the precariousness of his own position. Alone and cut off from British influence in the interior he frequently found himself bearing the "white man's burden," and judging from the number and magnitude of the risks which he ran it is hardly surprising that his book is strongly anti-Abyssinian.

Major Darley was in Abyssinia for seven years before the war, trading in ivory upon the borders of the Sudan. During that time he saw enough of the slave traffic, which in the later years of Menelik almost depopulated that area of its Shankalla tribes, to be able to present a formidable indictment of Abyssinian civilization. It is not made clear however in the preface and appendices to this new edition that conditions have completely changed during the reign of Haile Selassie, and what was originally a plea for British reprisals against frontier incursions countenanced by the Abyssinian Government or, at the most, some

kind of League control of slave traffic, is made to look like new evidence in favour of the present Italian case. The chief impression that remains after reading the book is the personality of the author himself. This can best be conveyed in the words of Major Athill who travelled with Darley after the war when he returned as frontier agent at Maji. He said—in a paper read to the Royal Geographical Society in 1920—"Major Darley possessed to the highest degree the qualities of courage, sympathy, and unswerving honour which have built up the reputation enjoyed by our countrymen throughout Africa." This cannot be doubted by any one who reads his book, but it is in a way regrettable that his modesty did not allow him to make a little more of his experiences as material for a longer and fuller account of his adventures. It is of course a criticism frequently made about the works of pioneers and must be qualified by the observation that such men as Major Darley are seldom anxious for more limelight than is necessary for putting on record the bare outlines of their work.

Colonel Rey's book, on the other hand, is as impartial and full as could be desired. An intimate friend of the Emperor, he has received every possible facility for writing about the history, ethnology, and civilization of Abyssinia. A good deal of the subject-matter is to be found in a previous work called "Abyssinia as it is To-day": but in bringing it up to date Colonel Rey has been careful to incorporate little of the sensational and ephemeral matter which has been used by journalists since the political situation began to guarantee the news value of gossip. He has concentrated rather upon the more permanent aspects of Abyssinian civilization, including however a character study of the Emperor and chapters on the slavery question and the military strength of the country. The chapter on slavery is a model of conciseness and clarity and the author has taken considerable trouble to ascertain the facts of this important question.

"The Real Abyssinia" is probably the most accurate and full account of the country yet published, and as such deserves to be widely read. J. B.

CAMELS THROUGH LIBYA; A Desert Adventure from the Fringes of the Sahara to the Oases of Upper Egypt. By DUGALD CAMPBELL. *London: Seeley Service & Co.* (1935). $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 292 *pages; illustrations and map.* 18*s*

This book describes a journey by camel through Italian Libya in 1931 and 1932. The route followed was from Tripoli southwards to Ghat and Murzuk and thence east to Jaghbub, Dakhla, and the Nile. The book adds little of interest to our knowledge of Libya: we hear a good deal about the Italians, for whom Mr. Campbell has a great admiration, but too much about their generous hospitality and too little about their administration. The author writes contemptuously of Islam which he considers to be "down and out" and is equally critical of the Senussi. There are some good photographs and a very bad map, on which few of the places mentioned in the text are marked but which shows some that do not exist in reality. We should not, in these days of good atlases and Survey Departments, be given, as in S.W. Egypt, the topography of 1849. W. B. K.-S.

SONS OF ISHMAEL; A Study of the Egyptian Bedouin. By G. W. MURRAY. *London: George Routledge & Sons* 1935. 10×6 *inches;* xvi+344 *pages; illustrations.* 18*s*

When anthropologist, archaeologist, and linguist collaborate with geologist and surveyor to write about the country in which they have worked together for a quarter of a century one expects something out of the ordinary. Mr. Murray economically combines all these in himself and the result justifies the plurality. Mr. Murray has been fortunate for, serving in the Egyptian Desert Surveys, he

has been paid by a generous government to study those parts of Egypt which, as people are beginning to realize, it is worth paying to go and see. He has also been fortunate, as he frequently acknowledges, in his friendship with Major Jennings Bramly on whose wide knowledge of the Badawin he has been able to draw.

By Badawin in this work is meant an inhabitant of the desert, by no means necessarily an Arab: thus the author brings within his title both the Hamitic Beja of the Eastern Desert and the Berber nomads of the Mediterranean coast. After an introductory Part I with chapters on The Desert in Ancient Times and The Arab Invasion, the next two parts deal with the Badawin in every phase of their life—at home in the tent, away raiding, of their beliefs, customs and ceremonies, their animals and amusements. The Badawin is inherently litigious and the most useful and interesting chapters of the book are those which describe their rigid yet unwritten code of laws in which compensation for injury is all important and punishment or deterrence of minor interest. An appendix on Western Desert Law treats of the subject among the Awlad Ali west of Alexandria. In Part IV are short notes on the individual clans, and here Mr. Murray emphasizes how much of the Libyan and how little of the Arab there is in the tribes of the Mediterranean coast. To the Badawin a pedigree going back to the time of the Prophet is much the same as our "coming over with the Conqueror": hence an incentive to invent genealogies and obscure the real lines of descent.

There are more than twenty excellent photographs of Badawin types and a few pictures, not so good, of the country they live in. Four sketch maps in the text illustrate the area under discussion, tribal distribution and desert wells. We may note a few small points for the next edition. A paternal uncle is *'amm*, not *khal* (p. 189): 'Abdul 'Aziz, not 'Abdalla, is the first name of the present king of Arabia: and (p. 268) the penalty for killing a Hiteimi should surely be *less* than for another man. And will Mr. Murray show us what exactly *is* a *sinkwab*?

W. B. K.-S.

ABYSSINIA ON THE EVE. By LADISLAS FARAGO. *London: Putnam* 1935. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* x+286 *pages; illustrations and maps.* 10*s* 6*d*

Written of necessity in haste, this book is good journalese and makes no pretensions to literary merit, profundity of thought or research. The subject-matter however is of such absorbing interest that it only required M. Farago, an enterprising unbiassed and one might say (considering his Hungarian origin, English employment, and German domicile) "international" journalist, to produce this book for its success to be assured.

The author wastes no time embellishing his subject unduly. He gives us facts, and his manner of presenting them is stimulating and attractive in its conciseness, humour, and genuine regard for truth. He gives a picture of life in Abyssinia as he saw it. It is obvious however that a summary of life and conditions in a country, written after a sojourn there of less than three months, can only be at the best entirely superficial, more especially so in the tense and unnatural conditions prevailing at a time when war was imminent.

M. Farago has the gift of selecting what is relevant from the confusing mass of first impressions, and the book gives a very true account of Abyssinia as she is to-day and the diplomatic and internal problems which confront her. From the equally slight, but less impeded knowledge which I acquired during a visit to the country in 1933, I subscribe absolutely to all that he writes which came within my own experience.

M. Farago draws few conclusions; he gives facts as he learned them, things as he saw them (and these were many and strange), and the opinion of persons

with whom he talked. Out of the dark confusion of semi-barbarism, and against a background of intrigue, drama, and ancient tradition one figure emerges, impressive and infinitely sad, the Emperor. Haile Selassie dominates the scene, a man both visionary and practical, tragic in his lonely vocation, the reform of his backward race.

The last chapters describing M. Farago's expedition to the Ogaden front, intrepid in the cause of the Press, and the dangers and adventures of this journey, are exciting reading, and the risks he took probably in no way exaggerated.

E. N.

LE POPOLAZIONI INDIGENE DELL'ERITREA. By ALBERTO POLLERA. (Manuali Coloniali, pubblicati sotto gli auspici del Ministero delle Colonie.) *Bologna: Licinio Cappelli* 1935. 7×4½ *inches;* ii+337 *pages; illustrations. L.*16

This is the second of the Colonial Manuals. It is full of historical and ethnological information, uncorrelated but plainly set down. It would in fact be extremely difficult to correlate the legends, rivalries, religious and social feuds, of a mixed and largely floating population. Signor Pollera has had to content himself with short paragraphs dealing with as many tribes as possible, giving their religious, social, and political history and saying something of their physical appearance: but the result is often little more than a collection of names. In speaking of one of the Saho-speaking tribes to the north of Massawa, for instance, he can say little more than that the tribe consists of about 3000 souls and is divided into seven sections, of which he proceeds to give the names.

The illustrations are well chosen and show more clearly than any text the great variations in development and civilization, ranging from the Yemenite Arab (facing p. 241) to the primitive Cunama tribe (facing pp. 193 and 208).

M. C.

AFRICAN LOG. By SHAW DESMOND. *London: Hutchinson & Co.* 1935. 9½×6 *inches;* 282 *pages; illustrations.* 18*s*

The novelist-dramatist author of this book describes it as an African Essay which "makes no claim to comprehensiveness or authority," and one which is based on a purely personal point of view. Despite this, or rather perhaps, because of it, the book may claim to give a vivid picture of some aspects of life in the continent—in South Africa and Rhodesia: in Zambezia and Portuguese East Africa: in Zanzibar and Egypt. It is written apparently for a wide public, and as the title indicates is in diary form, the result of which is that it suffers almost inevitably from dis-connectedness and a marked inequality of interest from part to part, introducing details, personal and otherwise, of importance to the writer alone. But the reader who constantly and judiciously "skips" will find much to appreciate, and much that will add to his knowledge of the country and his sympathy with its people. Thus there are interesting sidelights on matters so diverse as the differing local attitudes to the problems of Dutch versus English, and those of Black and White Magic.

Incidentally a certain amount of topographic description is introduced, but serves to make only a very sketchy and incomplete background and one regrets that the author has not given more of his time and attention to such matters, all the more by reason of the vividness and picturesqueness of the descriptions that do occur. In short, whatever its omissions, and however much one may disagree with some of the conclusions and pronouncements on things English and German as well as African, there is throughout the whole book a sting of reality that more than compensates. The reader may be aggravated or saddened

by his perusal, he cannot fail to be impressed. Neither can he fail to appreciate some of the 600 illustrations, many of them concerned with subjects of human geography, having as captions quotations from the author's verse. B. H.

NORTH AMERICA

90° IN THE SHADE. By CLARENCE CASON. *Chapel Hill: University of North Carolina Press* [*English Agent: Oxford University Press*] 1935. 9×5½ *inches;* xiv+186 *pages; illustrations.* 11*s* 6*d*

Each of the slight essays which comprise this book deals with some one or other of what we all recognize as economic and social problems characteristic of the American South. The method is that of illustrative narrative, and is not in any way systematic or comprehensive. The author would hardly claim to have made here any serious contribution to the sociology of the South: but the popular, almost journalistic nature of the work, may attract a number of readers who would never glance at more elaborate studies: and since Mr. Cason writes not only vividly, but with obvious knowledge, sincerity, and sympathy, this is all to the good. L. R. J.

CABINS IN THE LAUREL ["Intimate glimpses of life in the Toe River Valley of the Carolina Blue Ridge"]. By MURIEL EARLEY SHEPPARD. *Chapel Hill: University of North Carolina Press* [*English Agent: Oxford University Press*] 1935. 9×5½ *inches;* x+314 *pages; illustrations and sketch-map.* 13*s* 6*d*

The author of this book, the wife of a mining engineer, has lived among communities of the Hill Folk of the Southern Appalachians. The Toe river system is set amid that confused mass of forested mountains which lie in North Carolina between the Blue Ridge and the Unakas. A difficult terrain, and until recently an almost complete lack of communications, for long preserved this and similarly situated areas from the influence of modern development. Here the people built their own homes, made their own furniture, produced their own textiles and foodstuffs, and—quite illegally—concocted their own strong drinks. Trade was barter and currency very limited, until the valley became invaded in turn by mica miners, the railway, and the motor road.

Social and geographical studies of such areas are not wanting, but here is something at once more intimate and more popular. Mrs. Sheppard evidently did not remain for long the "furriner" among these folk. They told her of incidents in their lives and in the lives of their forbears, and in these yarns and in what Mrs. Sheppard has herself observed and recorded, one sees clearly the influence of the mountain environment.

Thus is drawn a sympathetic but by no means idyllic picture. Illiteracy and some measure of ignorance and superstition are no doubt disappearing with the opening up of the area; but will there be lost too that multifarious craftmanship which distinguished the best of the Mountain men, and something also of their independent self reliance?

The book is illustrated with a large number of most attractive and significant photographs. L. R. J.

CENTRAL AND SOUTH AMERICA

GEOLOGIE SÜDAMERIKAS. By H. GERTH. Erster Teil. (Geologie der Erde. Edited by ERICH KRENKEL.) *Berlin: Borntraeger* 1932. 10½×7 *inches;* viii+200 *pages; illustrations and maps. M.*22

Professor Gerth apologises in his preface for undertaking the description, in this part of the *Geologie der Erde*, of a continent of which he has only visited a

small portion. A frank compilation however by one man of sound judgment is likely to be better than an agglomeration of separate descriptions by specialists on different areas, and we think Professor Gerth has done his work well. This first part deals with the geological history of South America to the end of the Palaeozoic era.

No two continents are alike, and the special feature of South America is its division into two well-defined but very unequal parts. The main or eastern division consists of a series of ancient continental blocks—Guiana, Brazil, and scattered smaller ones reaching to Southern Patagonia, between which are the basins of the Amazon and Paranà, and other lesser basins. The other division is the Cordillera, composed of folded rocks margining the northern and western coasts, in a band usually 200–300 miles wide but expanding to 500 miles in the region between lat. 15° and 25° S. Nearly half the book is concerned with the pre-Palaeozoic rocks of both regions. Cambrian and Ordovician strata are confined to the broadened part of the Cordillera, but Silurian (Gotlandian) rocks appear in the Amazon Basin also, where they are followed by Devonian and Carboniferous. Marine Devonian extends over very wide areas, and from the Bolivian Andes and Matto Grosso to the Falkland Islands its fauna links it with South Africa, while in the Amazon basin and Venezuela the fauna is different. Carboniferous rocks, partly marine, partly plant-bearing, occur in the Andes, marine only in the Amazon basin, none in the other Devonian areas. Then, over practically the same areas as the Devonian, comes the so-called Permian, with its glacial phenomena, its special *Glossopteris* flora with an occasional shallow-marine fauna of Australian type and the aquatic reptile *Mesosaurus* shared with South Africa. The relations between these younger Palaeozoic formations in the three southern continents afford scope for much discussion on continental drift, but Professor Gerth presents the facts without bias.

A. M. D.

BRAZIL; A Study of Economic Types. By J. F. NORMANO. *Chapel Hill: The University of North Carolina Press* [*London: Humphrey Milford*] 1935. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii+254 *pages; map.* 13*s* 6*d*

The keynote of this competent study of Brazil is the conception of the moving frontier as a result of the growth of internal colonization, and that makes the book largely an essay in historical geography. Mr. Normano has an intimate and scholarly knowledge of his subject and writes with penetration. He devotes half his space to a striking survey of Brazilian economic history, passes on to an account of the chequered story of public finance and banking, and concludes the text with a chapter on the present-day economic organization of Brazil under the title of "The Second Republic": a Selected Bibliography, Glossary and Index occupy more than twenty further pages.

The interpretation in terms of living and moving forces lends a lively human interest. Good examples of this method appear in the description of the sertão as an immense ill-defined area of "back-blocks," in transition from nomadism to capitalist economy, yet forming the backbone of Brazil: in the account of the rise and relative decline of British influence in Brazilian economic life: and in the emphasis laid upon the inherent difficulties of a political union side by side with economic disunion. According to Mr. Normano's analysis the most pressing need of Brazil is for improvements in transport, so as to bring more of the "non-economic" territory (the sertão) within the orbit of the "economic" regions of active capitalistic development, and thus "inject an economic substance into the political area." Provided this can be accomplished, as it has been by fits and starts in the past, budgetary deficits are not really alarming: for

the potential expansion of economic territory and consequently of revenue resources is enormous. In short, Brazil has suffered and is still suffering from too much land and too few people—hence the crises of the prevalent robber economy and the paralysis of widespread economic under-development.

E. W. S.

AUSTRALASIA AND PACIFIC

THE NARRATIVE OF GEORGE RUSSELL OF GOLF HILL, with Russellania and selected papers. Edited by P. L. BROWN. *London: Oxford University Press* 1935. 10×6½ *inches;* 470 *pages; illustrations* (*line drawings by* STIRLING PATERSON). 17*s* 6*d*

George Russell, born in 1812, belonged to one of a number of related families who rented farms on the north shore of the Firth of Forth near Elie and Kirkcaldy. In 1821 his half brother Philip had emigrated to Van Diemen's Land, then emerging from a period of famine and of bush-ranging. George followed in March 1831 when the colony had been separated from New South Wales and was prospering under its first Governor. He farmed in a small way or acted as manager to Philip until March 1836, when he visited Port Philip Bay, where there was a new settlement on the south coast of New Holland which had been reached by exploration from New South Wales as early as 1824. In 1847 Russell's narrative explains the part played by Tasmania and the Port Philip Association in the foundation of what became in 1837 the colony of Victoria, describes its early settlement and traces the varied fortunes of the Clyde Company of Glasgow to which he was manager from that year to 1846 when it was doing well with several sheep and cattle stations west of Port Philip Bay, including that of Golf Hill. The station was purchased by four partners of whom George Russell was one, his brother Alexander being appointed manager. George had also part-owned stations on his own account and was now in a position to pay a visit to Europe. After a short time in Tasmania and then in Sydney he went *via* Manila, Singapore, India, and Malta to England. He spent from October 1850 to September 1853 in this country, in Scotland, and in Ireland, in taking a sick sister to Madeira, in marrying and in a honeymoon on the Continent. When he returned to Victoria the gold digging was in full swing and the colony was in a very unsettled state. He had serious thoughts of returning to Scotland, but after a few weeks he renewed his interest in his work and became reconciled to a settler's life. He continued to look after the interests of the Clyde Company until it was wound up about the year 1856, when its capital, which in 1836 had been £10,000, was valued at a quarter of a million. He had settled down with his family at Golf Hill, which became his own, and had acquired some further properties. In 1873 he went again to England and Scotland and in 1874 revisited India. He was back at Golf Hill early in 1876 continuing his active life and dealing in station property. He died in 1884 worth about £250,000, having started in 1836 with about £100.

The main part of the book is a narrative dictated to one of his daughters between the years 1881 and 1884. It is amplified by letters to his brother Philip, to the Clyde Company management in Scotland and to others and also by numerous relevant notes by the editor, Mr. Philip L. Brown. In the course of the narrative there is much information about happenings in the young colony. The convict system and the native war in Tasmania; the native problem, less critical in the Port Philip district than in other parts of Australia; the conditions in early Melbourne and Geelong; the changing laws with regard to the occupation and acquisition of land; the various expeditions of the settlers; the attempts

to dispose profitably of the carcases of superfluous stock; the rough inns which became hotels; the slab huts which were replaced by more substantial buildings; the hunting of the dingo and the affairs of the Scotch church are all described and discussed. Russell's observations on his tours in Asia and Europe are of less interest as his travels were along routes often described; he was always on the look out to gain agricultural knowledge especially about sheep.

The narrative, that of a shrewd, hard-working and plain man, is very readable. The plan of adding to it notes and letters results in many repetitions, and owing to this and certain redundant matter the book is unduly long and weighty. The accounts of the Russell family in Scotland and of their farms will scarcely be of interest except to the family and the many names of persons, partnerships and properties in Australia in the past are not likely to be studied except by the old families of Victoria. There is too much preliminary matter and the appendices have little connection with the real subject of the book. The coloured illustrations and some of the woodcuts are good and the maps are useful, particularly that which constitutes the back end-paper. The quotation from Anthony Trollope on the cover is singularly appropriate.

THROUGH WILDEST PAPUA. By J. G. HIDES. *London: Blackie & Son* 1935. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* x+166 *pages; illustrations and maps.* 8*s* 6*d*

The governing of primitive tribes in New Guinea is of more than ordinary interest, because this is one of the few parts of the world where there is still the chance of proving whether contact with races of a higher culture can help on backward races in their own development.

The humiliating failures in other parts of the Pacific are well known.

In the Territory of Papua (British New Guinea) a form of administration has been built up by which the wild, native tribes are governed without destroying their own culture, except only where their own customs—such as eating one another, or collecting human heads—clash with the social ideals of civilization.

It is become a traditional code of the Territory, to which the administrative staff loyally adheres, to bring the natives gradually to submit to white man's laws because they are consistently just, and not because the white man is better armed.

It is chiefly upon Resident Magistrates, Patrol Officers, and their Assistants that the success of this scheme rests, and in 'Through Wildest Papua' the author, Mr. Jack Hides, who is an Assistant Magistrate, gives a most impressive account of raids into uncontrolled areas, such as are continually undertaken, in order to arrest native murderers. The criminals must be brought to justice so that it may be explained to them that they have broken social laws which they never heard of before, and to make the lesson more poignant these arrests must of course be carried out without bloodshed. This double task appears to be superhuman.

Mr. Hides' account makes very fascinating reading. Throughout the book is discernible his whole-hearted loyalty to the spirit as well as the letter of the Territory's policy, which has been brought to a fine adjustment by the present Governor, Sir Hubert Murray, who writes the Introduction to the book.

There is also the author's personal sympathy with these likeable savages, and appreciation of their attitude of mind. The direct style of the narrative gives force to his pictures of the interior of Papua. The stories certainly need no embellishing, but might so easily have been spoilt by "journalese." Instead, we have graphic accounts of journeys among unknown and hostile tribes, up and down terrific, precipitous mountains, demanding almost incredible endurance and courage, with vivid sketches of scenery and vegetation.

Mr. Hides hopes that civilization may yet find some legitimate channel to absorb surplus energy in the place of raiding cannibalism and head-hunting. Let us hope that his optimistic vision may prove correct.

There are many more chapters of the history of that Territory which deserve to be written. There is Mr. Jack Hides' further expedition when he discovered a new tribe: his account of this will be looked for expectantly. But earlier chapters exist for the most part only in the official records—heroic exploits told in stiff, terse phrases. So much is lost that might have helped enlighten us on many points about this attractive, untamed island. We are all the more grateful to one who is not inarticulate, but sets scenes so clearly before his readers.

L. E. C.

PHYSICAL AND BIOLOGICAL GEOGRAPHY

HANDBUCH DER KLIMATOLOGIE. Edited by W. KÖPPEN and R. GEIGER. Band II, Teil K. Klima des Kanadischen Archipels und Grönlands. 1. Übersicht über das Klima des Polarmeeres und des Kanadischen Archipels. By H. U. SVERDRUP. 2. Klima der Küsten von Grönland. By HELGE PETERSEN. 3. Klima des Grönländischen Inlandeises. By FRITZ LOEWE. *Berlin: Borntraeger* 1935. 10½×7 *inches; 102 pages; maps and diagrams. M.16 (Subscription Price, M.12.80)*

The 'Handbook of Climatology' under the general editorship of Professor Köppen of Graz and Dr. Geiger of Münich carries on the tradition of Hann's classic "Handbook." The latter remains unsurpassed as the work of a single author, but since the publication of the third edition in 1908 much new information has been collected which the newer work is intended to embody, and under the plan adopted of having the various sections written by authors with specialist knowledge several sections have appeared at intervals since the announcement of the work in 1929.

The present part, K, of vol. II is thus in three sections: (i) the climate of the Polar sea and the Canadian Archipelago by Dr. H. U. Sverdrup; (ii) the coasts of Greenland by Dr. Helge Petersen; (iii) the climate of the inland ice of Greenland by Dr. Fritz Loewe, each section comprising some twenty pages of text in which the various climatic elements are discussed at length and a number, determined by the available data, of tables giving the usual climatological means and extremes. A most useful feature is the map for each region showing the locations of the observation stations.

In section (i) Dr. Sverdrup relies largely on his own observations and experience during over six years in the Arctic to supplement the rather scanty data otherwise available. Two climatic regimes are distinguished: the polar maritime, represented by observations during the voyages of the *Fram* and *Maud*, and the polar coastal. In the former the annual temperature curve shows a flat winter minimum and a flat summer maximum at 32° F. In the latter where the snow cover of the marginal regions may disappear in summer the temperature curve shows a maximum in July of a few degrees above freezing-point.

A persistent feature is the inversion of temperature above the cold layer of air which lies on the surface; due to this the velocity of wind near the surface of the polar sea is generally small.

An interesting point is that the clearness associated with polar air in our latitudes is a property acquired on the way, visibility in the polar regions being often poor.

For section (ii) there are available several series of observations extending up to thirty years or more. It is significant however that between 60° and 70°

latitude the index map shows ten observation stations in West Greenland whereas on the less accessible east coast Angmagssalik is the only station. The great variability of weather and the great differences between conditions at places which though comparatively near are in different orographical situations, are traced to the interplay which goes on over the coastal region between cold air masses from the inland ice and warm oceanic air masses.

The föhn effect may at times give phenomenally high temperatures, in winter higher than can be explained by simple advection, particularly in cases where the air of oceanic origin has been drawn over the ice-cap: thus at Upernivik, in about lat. 73° N., where the average temperature over fifty years in February is given as −10° F., the extreme maximum recorded is 60° F. The climate is often described as stormy—more so than statistics would show. It is possible that strong winds of short duration occur between the regular observation hours and thus do not get into the statistics.

The inland ice forms a separate climatic region with peculiarities which can be assigned to the profile and nature of the surface, and also to the altitude, as 50 per cent of the area of Greenland lies above the 2000-metre contour. Since Nansen's first journey on the inland ice in 1888 certain facts about the weather conditions had been collected in the course of travel during the warmer part of various years, but continuous observations at fixed stations on the inland ice had not been made available previous to the expeditions of Alfred Wegener and H. G. Watkins in 1930–31. The names of these leaders and of F. Malmgren as well as place-names which recall earlier expeditions are a reminder of the cost in life at which knowledge of the polar regions has been gained.

Dr. Loewe, aided by his personal experiences with the Wegener expedition, gives a critical discussion of the observations from the stations on the inland ice. Previous deductions regarding the prevailing low temperatures are confirmed, and although the extreme lowest temperature recorded at "Eismitte" (the central station of Wegener's expedition) −84° F., is not so low as has been observed at the "cold pole" of Siberia, the annual mean temperature of −22° F. is the lowest yet recorded on the globe. Evidence is found for correcting other previous deductions: for example, the fixed central zone of calms is non-existent; the central cold region appears to be fixed neither in time nor in space: the cold air layers at the surface are not deep enough to be effective for the formation of depressions.

This section will repay the most careful study by those who are interested in the problems of an ice-dome.

The extensive and clearly presented summary of climatic data now made available in these three sections may be considered indispensable to students of polar climates. The reader who is accustomed to other units will require conversion tables from degrees Centigrade and barometric millimetres. The lists of references will be found useful, that given by Dr. Loewe of the literature referring to the ice-cap being particularly extensive. S. T. A. M.

CARTOGRAPHY

ATLAS NIEDERSACHSEN, Herausgegeben vom Oberpräsidenten der Provinz Hannover. Compiled by KURT BRÜNING. *Oldenburg* 1934

This atlas is published to supply a clear picture, much needed by those interested in economic and social planning, of the nature of the land and its inhabitants, its social, economic, and cultural conditions. The recent publication of statistics by the Arbeitsdienst and those in connection with the planning of housing estates, supplied the necessary material, which has been supplemented by

various public and semi-public departments and learned societies. The maps were compiled mainly by Professor Brüning and drawn by Fräulein Liebau of the Archiv für Landeskunde.

The atlas consists of 122 plates in colour, of which the first twenty-three are physical. These, apart from a map of the water-net, and some very detailed maps of the Frisian coast based on the work of the port and harbour authorities, are much generalized. Sources from which the compilation has been made are given on most of the maps. The Karte des Deutschen Reiches 1 : 200,000 is the basis for the topographical maps in most instances.

The area here described as Lower Saxony includes the Prussian province of Hannover together with the states of Brunswick, Oldenburg, Schaumburg- and Detmold-Lippe, the free City of Bremen, and part of northern Westphalia. Although exhibiting great physical variety the area may claim a certain geographical unity and is fairly well defined by the North Sea coast and by the rivers Ems and Elbe, though many German geographers would deprecate the use of a great navigable highway as a geographical boundary. The Teutoburger Wald makes a clear border in the south-east. The area portrayed is geographically interesting mainly for the immense variety and sharp contrasts of landscape that it offers in dune and peat moor, morainic deposit, and loess belt, to say nothing of the Weser hill country with its immense variety of sedimentary rocks. Climatic maps include those showing the distribution and duration of frost, the number of days of snow-fall, duration of snow-cover, average daily insolation, etc. The sandy areas and moorlands are particularly liable to suffer from frost.

The physical maps are followed by a series showing population distribution and density conditions, actual and at various dates, also population movements between 1905 and 1925. The curious fact is brought out that it is precisely the good agricultural lands whose population has decreased, while poorer areas have actually gained. Reasons suggested are the demand for a higher standard of living entailing smaller families and an increasing use of machinery in agriculture, resulting in unemployment and migration. Professor Tackenburg, of the Hannover Landesmuseum, contributes a series of sketch-maps and notes regarding settlement in pre-historic times in which he traces the Saxons back to a group of people occupying East Hannover and Schleswig-Holstein, Mecklenburg, and Scandinavia, who, in the course of the Bronze Age settled in Germany. The area, united under the rule of Henry the Lion in the Middle Ages, is reunited, after a long period of fragmentation, in an economic bond—the Steuerverein, later the Zollverein, and now the economic groups of the NSDAP, in which however it is interesting to note the Lippes are grouped not with the Saxon groups but with the northern Westphalian *Gau* on the other side of the Teutoburger Wald. Perhaps the industrial development of Bielefeld may have some connection with this.

The work bears some evidence of the haste in which it has been brought out, in the somewhat haphazard selection and arrangement of the maps. It is nevertheless a most creditable production, and although primarily intended for those engaged in social development schemes offers much that is of interest and value to the geographer. H. O.

CHUNG-HUA-MIN-KUO HSIN TI-TU (A New Atlas of China). *Shanghai: Shen Pao Press* 1934. $12.00

For a number of years Drs. V. K. Ting and W. H. Wong, past and present directors of the National Geological Survey of China, with Mr. S. Y. Tseng as cartographer, have been engaged in the preparation of a series of maps of China

based on the most reliable and up-to-date material from published and private sources accessible to the staff of their organization. The result, issued to commemorate the sixtieth anniversary of the Shanghai newspaper *Shen Pao*, is this surprising volume, which is a tribute to the high grade of craftsmanship of all concerned in its production.

It comprises fifty-three double-page maps, followed by 180 pages of gazetteer. The political and physical maps are in pairs, the first showing drainage, culture, and administrative boundaries, the second giving relief in layer-colours—N.W. Szechwan uses fourteen distinct altitude tints—and with enough of the more important culture data to serve, with the drainage, as a correlation net between the two maps. China proper is represented on a scale of 1/2,000,000 while Mongolia, Sinkiang and Tibet are on 1/5,000,000. The main series of forty-two areal maps is preceded by seven double pages given to charts of meteorological data, crop distribution, mineral resources, population, communications and the like, while fifty-eight city maps appear at the end. The gazetteer lists over 33,000 place-names with their geographical co-ordinates, italics being used to distinguish those position determinations that have been established astronomically.

The quality of draughtsmanship, the choice of colours, and the registration are of a uniform high standard of excellence. The double sheets are printed as units, with index-maps on the reverse, securely bound along the hinge-line with linen tabs so as to open fully and stay flat. The atlas is issued in cloth boards, quarter-bound in leather.

The one grave drawback to the general use of the atlas by Western geographers is that, being intended for the people of the country in which it is issued, it employs only Chinese characters throughout. Though roman lettering could not have been used on the maps without overcrowding to the point of illegibility, one would have thought that at least English titles and legends for the statistical and other maps might have also been inserted in fine type. It is to be hoped that when a second edition is contemplated—and it is hard to see how such excellent workmanship can remain long at so low a price without going out of print—the gazetteer will be expanded to include a romanized list of place-names with index numbers, allowing reference to the corresponding Chinese list or with some system of co-ordinates by which precise identification of localities can be ensured.

Even with this serious limitation to its present usefulness, the atlas will receive a wide welcome. It becomes automatically the standard publication of its kind for China. That such a superb piece of work should have been prepared and put through the press during the disturbances of the recent years reflects high credit on the patience and determination of the leaders of the Chinese Survey. G. B. B.

CARTOGRAPHIE COLONIALE. By Colonel ED. DE MARTONNE. (Les Manuels Coloniaux. Edited by GEORGES HARDY.) *Paris: Larose* 1935. 10×6½ *inches; 298 pages; illustrations and maps.* 35 *fr.*

Colonel de Martonne gives a full and careful account of the survey and cartography of the French colonial empire based on his twenty years' service in the geographical services of the various colonies. The subject is treated from a very practical point of view and the difficulties of the work in the colonies are well illustrated by frequent examples from the author's experience. After the introduction, which contains a clear exposition of the relation between cartography and geography, the book is divided into four parts; surveys, map publication, the use of maps and the present situation in the colonies. The second part is perhaps a little overburdened with general discussion on map projections and

grid systems but contains a useful chapter on the rendering of place-names, whilst the third part is rather an elementary general treatise not strictly confined to the French colonies or even to maps. The main interest to geographers lies in the first and fourth parts.

Under the heading "Map Material" the first part covers all the various methods employed in the colonies and ranges from the compilation of travellers' reports to rigorous modern methods of topographical survey. Where the maps depend on explorers' work and fixings, much useful work has been done in collating and publishing comprehensive lists of the points. The technique developed for provisional maps in French West Africa is an excellent example of adapting modern methods to suit administrative and economic demands. The method comprises a framework of points fixed astronomically with the prismatic astrolabe and wireless time signals with the detail filled in by plane-table traverse. The density of the traverses is suited to the amount of information required at the moment and can easily be increased later. The description of regular surveys covers the whole science from the geodetic framework to the plane-tabling, yet it succeeds in giving, in sixty-seven pages, a clear outline of the essentials of the processes with ample illustrations. It appears that the intersection of natural objects during triangulation to provide auxiliary points is not permitted. Whilst this is sound for the larger scales of survey, it is clear from the example of 1/100,000 scale plane-tabling in Madagascar (p. 75) that a relaxation of the rule would have saved the planetabler the considerable amount of work expended on a complete graphical triangulation of the area. The author seems to be sceptical of the value of air survey for original topographical mapping in spite of the fact that he cites the invaluable services rendered by air survey maps in the Riff campaign of 1925–26. The explanation may perhaps be found partly in the author's length of service and partly in the fact that French methods are not as suitable for medium and small-scale topography as the methods developed in the British Empire.

It is difficult, from the fourth part, to get a clear picture of the state of mapping in the empire as a whole, since each colony is dealt with separately each with its own index on its own scale. Speaking generally, it appears that, apart from several small areas in the Sahara aggregating about 200,000 square miles, maps exist of the whole of the colonies, and that the colonies are covered by accurate surveys and maps on scales appropriate to the particular areas in the following proportions; Algiers and Tunis 2/3: Morocco 1/10: West Africa 1/20: Equatorial Africa 1/15: Levant 1/40: Madagascar 1/10: Indo-China 1/2. This is a very fine achievement and the French may well be proud of their contribution to the basis of geography.

The book as a whole clearly indicates the confusion arising from two origins of longitude (Paris and Greenwich) and two systems of angular measure (sexagesimal and centesimal). A table showing the origin of longitude, the system of angular measure, the figure of the earth and the map projection used in each colony would be a great help to the reader. There are mistakes in arithmetic, such as the statement that an error of one part in a million is 0·1 mm. in 10 km. (p. 30) instead of 1 mm. in 1 km.: that one sexagesimal second is equal to 30·86 centesimal, instead of 3·086: or that a tenth of a centesimal second of latitude is about 10 metres (p. 40) instead of about 1 m. The diagrams are clear but the illustrations suffer from being printed on poor paper. We hope that the lack of verticality of the primary triangulation signals in Figs. 5 and 15 is the fault of the block maker and not of the surveyor.

It is to be hoped that the British Empire will find as able an historian of her cartography as Colonel de Martonne. D. R. C.

ECONOMIC AND HISTORICAL GEOGRAPHY

CHRONIQUES DE GOMES EANNES DE AZURARA. La conquête de Ceuta. La découverte de la Guinée. (Les grands Navigateurs et Colons Portugais du XV^e^ et du XVI^e^ siècles. Anthologie des écrits de l'époque. Edited by VIRGINIA DE CASTRO E ALMEIDA.) *Paris: Duchartre* 1934. $8^{1}/_{2} \times 6^{1}/_{2}$ *inches;* xiv + 200 *pages; illustrations.*

This book contains an abbreviated translation of the two most important works of the famous Portuguese chronicler Gomes Eannes de Zurara's 'Chronica da conquista de Ceuta' and 'Chronica de Guiné,' preceded by a short introduction by the translator and Maréchal Lyautey's preface. Senhora Castro e Almeida, who has for some years represented Portugal in the International Institute of Intellectual Co-operation, at the League of Nations, is a Portuguese writer well known through a large output of nearly thirty volumes, mainly romances and novels of an educational character. Zurara (correct spelling of Azurara) and Fernão Lopes were the earliest Portuguese chroniclers and among the best. English readers are well acquainted with Zurara and his work through the good translation published in 1896 and 1899 by the Hakluyt Society, under the title of 'The Chronicle of the discovery and conquest of Guinea,' containing the valuable studies of Professor E. Prestage and C. R. Beazley and also through the former's critical study 'The Chronicles of Fernão Lopes and Gomes Eannes de Zurara', 1928, and others of that distinguished scholar Mr. Aubrey Bell. The personality and worth of Zurara as a chronicler and a writer have been much discussed since the sixteenth century, but at present all his critics consider him a great historian, writing of contemporary events and places he had himself visited with great sincerity, a picturesque style and philosophic criticism. "Azurara," says Professor E. Prestage, "belongs to the line of Portuguese chroniclers who rendered illustrious the fifteenth and sixteenth centuries, a line that began with Fernão Lopes and culminated in Damião de Gois and João de Barros, both of whom were almost historians in the modern sense of the term, and at the same time masters of prose style." These two Chronicles, the conquest of Ceuta and the discovery of Guinea, must undoubtedly always rank as Zurara's masterpieces. Wishing, perhaps, to make the reading more attractive Senhora Castro e Almeida has left out some of the less descriptive chapters and shortened many passages: the omission of Chapter II of the 'Chronica de Guiné' is specially to be regretted, for it is one of the most beautiful pieces of all Zurara's work. At the same time the translation is not always quite accurate. In the end of Chapter XVI we find in the translation (p. 114) a reference to the "pays des nègres appelé Ouan-gara," as if it were in the text of Zurara, which is not true: this name is collected from El Edrisi, in a note by Viscount Santarem in the original Portuguese edition of the Chronicle. In her Introduction Senhora Castro e Almeida says; "Ceuta était alors ce que Venise devint un peu plus tard; le grand entrepôt du commerce d'Orient," but Ceuta never had the commercial importance of Venice and its commerce with the East was not more important than that of the famous Adriatic city. On p. 9 we read; "L'Infant fonda à Sagres une école de navigation . . .," which to-day has been demonstrated to be simply a legend, and that the mathematician and cosmograph Pedro Nunes, who lived a century later, was a companion of Prince Henry. In his Preface Maréchal Lyautey refers the existence at Sagres of the "restes d'une forteresse du XV siècle où vécut un prince, Henri le Navigateur" (p. XII), which is no more true than the "vice-royauté des Indes avec Alphonse d'Albuquerque," who was never viceroy. These small observations do not diminish the patriotic value of the work of Senhora Castro e Almeida and the valuable

Preface by the late Maréchal Lyautey—himself a great colonist—which ends with these words; "je salue l'effort colonisateur de Portugal comme l'un de ceux qui non seulement restent ennoblis de plus de gloire mais qui demeurent parmi les plus efficaces et méritent le mieux la gratitude de l'humanité."

A. Z. C.

GENERAL

LA DOTTRINA DELL'ISLAM. By M. M. Moreno. (Manuali Coloniali, pubblicati sotto gli auspici del Ministero delle Colonie.) *Bologna: Licinio Cappelli* 1935. 7×4½ *inches;* vi+192 *pages.* L.10

This is the first of the Colonial Manuals published under the auspices of the Italian Colonial Ministry. It is a short and well-written text-book, tracing the history of Islam from its origins and earliest developments down to the present day, when Islam, like all other religions, has a strong modernist movement to face. There are chapters on Islamic dogma, ritual, and law: a chapter on mysticism, and a brief account of the many schisms and heresies. Finally the last chapter is devoted to an account of the position of Islam in the modern world and the various movements in different countries—India, Turkey, and Egypt most notably—in which Islam has become either the inspirer of a new political nationalism or else the rallying point of the reaction.

There is an excellent bibliography, which includes German, French, and English as well as Italian books: and a full index of the technical Arabic terms, which have been carefully and consistently transliterated. M. C.

STEADY DRUMMER. By Stanley Casson. *London: G. Bell & Sons* 1935. 9×5½ *inches;* 282 *pages; illustrations and sketch-maps.* 12*s* 6*d*

This is a very well-written and readable account of experiences largely on the Macedonian front and farther east, during the Great War. Mr. Casson starts his book with an account of life in a German family at Bonn in 1909, and before he has finished the reader has been taken through France, Greece, Constantinople, Batum, and the Sea of Azov to Merv, Askhabad, and the "forgotten war" in Turkistan. The contrast between the author's first journey to Athens as an archaeological student and his return as an actor in the play of making the unwilling Greeks fight one or both sides in a war in which they were not at all concerned, is excellently drawn. The anecdotes of the behaviour of the allied occupying forces during the great fire of Salonika, the vignettes of French poilus lighting their bivouac fires against the columns of the Parthenon, or the six British soldiers who governed for a time the town of Kizil Arvat, the descriptions of Thessalian and Macedonian scenery—all are vividly and wittily written with no trace of sentimentality or self-delusion.

Mr. Casson emphasizes the gradual atrophying, in the course of war, of all sense of the beauty and value of anything whatsoever; and he can explain and understand the deliberate burning and destruction of beautiful or valuable things by the vague sense that the civilization which had produced these works of art had also led to the senseless massacre in which men were forced unwillingly to take part. The book is on the whole impartial; though the French army in Greece comes in for very hard words, and the White Russian troops and their leaders are not spared. There is a passionate plea for the Bulgarians at the end of the book, and Mr. Casson maintains that many of the post-war troubles in Europe might have been avoided if the Allies had been as logical in their treatment of Germany and Austria as they showed themselves with Bulgaria. "More honest than Germany, more truthful than Hungary, and more faithful than Austria, Bulgaria deserves the full honours of war due to an honourable and

stubborn enemy." And Mr. Casson ends his book with a passionate appeal against force, though backed by a declaration of willingness to see "vindicated once again the ideas for which we fought, rather than see the structure of civilization preserved in its present precarious form." M. C.

MOTOR CRUISING. By K. M. MILLER, JOHN IRVING, and others. (The Lonsdale Library. Edited by the EARL OF LONSDALE and ERIC PARKER. Vol. XIX.) *London: Seeley Service & Co.* [1935]. Size 8½×5½ *inches; 640 pages; illustrations.* 21*s*

CRUISES OF THE *JOAN*. By W. E. SINCLAIR. *London: Edward Arnold & Co.* 1934. 9×5½ *inches; 254 pages; illustrations and sketch-maps.* 12*s* 6*d*

The Lonsdale Library treatise on Motor-Cruising is a book that will certainly add dignity to the sport it is designed to assist. Motor-craft get from port to port on the whole quicker and more certainly than sailing vessels. This puts the motor-cruiser owner into a dilemma which does not arise for sailing men. When a man puts to sea under sail he does it for the pleasures of the voyage; although making a distant port is part of the delight of sailing it is not that which causes him to buy a yacht. The greater mobility of motor-craft makes it necessary for the owner to decide whether his pleasures are to lie in port or outside. Once that question is settled he can choose his ship, equip and run her in a proper way, according to his idea of the purpose of his sport. Nothing could be better than this book to help him. In particular the chapters by Lieut. John Irving make it clear that there is no need to assume that small motor-craft must essentially be badly built, stupidly rigged and discourteously, if not dangerously, navigated. The power ship has a dignity of her own and now that this book is published we may hope to see motor-yachts that carry both well-designed auxiliary canvas and ground-tackle that will hold; as well as owners who know how to wear the ship's colours correctly, how to leave or enter an anchorage courteously, and how to moor their craft so cunningly in the tideway that the sailing men nearby will be silent in admiration.

Mr. Irving, by the way, throughout the text for which he is responsible, uses the word "fend-off" where others have said and written "fender." The S.O.E.D. makes no mention of the first form of the word, while giving a 1626 authority for the second. It would be interesting to know whether "fend-off" is the traditional naval noun.

Mr. Sinclair's cruises were in a small yawl-rigged, deep-draughted yacht of a type generally known as a Falmouth quay-punt. Four voyages are described which should have been interesting, even if the difficulties caused by the smallness of his craft and the absence of any auxiliary engine should have preoccupied the author. The voyages, in themselves remarkable enough, were first round the British Isles, then to Vigo and Madeira, then to the Baltic, and finally to Iceland and Greenland, not far from which the author had to abandon his vessel. But the book is tiring to read, being written in a style without continuity or rhythm. The Caledonian Canal brings him to the statement: "My ability to admire fine scenery was greatly strained during the passage of the canal." Vigo is hidden behind a screen of bragging about the untidiness of the author. Madeira fails to make any impression.

The Baltic cruise makes the best part of the book. The excellence of the harbours and of the sailing conditions and the generous hospitality an Englishman receives at the hands of the Danes seem to have helped the author to write better. The splendid sailing in the Swedish archipelago or amongst the Danish islands should indeed be better known to English yachtsmen. In the Baltic and in the Belts there are harbours without tides or steamers, well-marked sheltered

fairways, and fishing villages of exceptional charm. A pity, then, that the author must needs make complaint of the Swedish customs men, who are in duty bound to examine all ships entering Swedish ports. If the Danes are lenient and rarely search yachts it is their own affair; it is on no account a reason for obstructing the Swedish agents who, as far as the reviewer's experience goes, are helpful, kindly fellows.

On the last voyage the ship was lost. The actual storm was probably normal for that part of the world. The southern extremity of Greenland, Cape Farewell, is visited at all times of the year by long and severe storms which raise a very high sea. The Atlantic north of the fifty-fifth parallel is as a whole disagreeable, and although the passage to Iceland was made in comparatively good weather, the author admits that the North Atlantic was a good deal more strenuous than it had been expected to be. The storm which finished the *Joan* began in the last days of August, always a dangerous time in Greenland waters. The yacht was put to her sea anchor and everything made snug. But the sea was irregular, the waves coming in from different directions. On the other occasions farther south in the Atlantic the ship had ridden comfortably and dry to the drogue, but here she was restless and took water on board. Finally there came a green sea which dismasted and strained her. That the author and his friend kept the hull afloat and contrived to get rescued was a creditable piece of work. The accident had shown that a Falmouth quay-punt of only 22 feet 6 inches length, seaworthy as the type is, for those particular waters is too small. One must remember that even such a fine yacht as *Typhoon* was lost with her owner while heading for Greenland. The only yacht which has ever reached the coast, Mr. Rockwell Kent's, was also wrecked there. M. A. S.

THE SPIRIT OF THE HILLS. By F. S. SMYTHE. *London: Hodder and Stoughton* 1935. 9×5½ *inches;* xiv+308 *pages; illustrations.* 20s

Mr. Smythe's books on Kangchenjunga and Kamet have proved his ability to describe as well as to conduct a great adventure, and last year we learned from his 'Alpine Journey' that smaller heights appeal to him no less than icebound Himalayan summits.

Many writers of many nations have endeavoured to portray the spirit of the hills. It is a brave man who will follow in the steps of such paladins as Leslie Stephen and Mummery, Emile Javelle and Guido Rey, Julius Kugy and Heinrich Pfannl. Mr. Smythe belongs to a younger generation which, to quote the words of Christian Klucker, usually prefers to make history rather than to write it. Yet he has found time to give us his own interpretation of the spiritual values of mountaineering.

In a volume of essays dedicated to the memory of Toni Schmid, whose name is enshrined on the northern crags of the Matterhorn, the young climber of to-day is described as "a hard-bitten fighter, for whom there is only victory or defeat, never reconciliation with the enemy. To give up a plan or to retreat is for him almost a spiritual disaster." There is nothing of this attitude of mind in Mr. Smythe's book. Read how with one companion he traversed the Aiguille Blanche in threatening weather, and then, at the sound of the hurricane raging among the upper cliffs of Mont Blanc, "with one accord we turned down." Looking back upon the mountain after a dangerous descent, he realizes that "mountaineering is not one of those pursuits the value of which can be estimated in terms of achievement; it is a happy union between man and the universe, a perfection of living and being." You may search the book in vain for any talk of the mountain as an enemy. The contemplation of Nature in the high places means more to him than success.

Mr. Smythe has a real gift for description, and his best work is to be found, not in the opening reflections of each chapter, but where he relates his own experiences, as in the traverse mentioned above and in his crossing of the Matterhorn from the Tiefenmatten Glacier to Zermatt. Nothing could be better than his charming portrait of Nima Tendrup, the Old Soldier of many Himalayan expeditions. One is reluctant to turn from such an admirable tribute of friendship to homilies on things rhythmic and cosmic, positives and negatives, the functions of creation and rejuvenated metabolism. Simplicity is the essence of his creed, yet he obscures many fine passages through redundancy or a superfluity of scientific terms. Digressions on education and war-time sermons accord ill with the grandeur of his vision of Nilkanta beneath a rising moon. Though he finds in mountain exercise a mental and spiritual bath, the thought which he carries to that bath is sometimes undigested as Juvenal's peacock. Many of his similes are well chosen, but he gives us excess of them, and *Prosopopoea* and *Comparatio compendiaria* bloom luxuriant in the crannies of his style.

There are a few minor mistakes such as Höhe Tauern, Stockjé, Schwartzsee; three, not four Europeans perished in the final tragedy on Nanga Parbat. As a boy, the author knew Whymper's 'Scrambles' "almost by heart," but he confuses Col Félicité with L'Enjambée, and attributes to Jean Antoine Carrel the words of Franz Lochmatter after his Täschhorn ascent of 1906. Whymper's judgment of the Matterhorn's east face arose, not from a chance view, but from observation of the extensive snowbeds clinging to the cliffs.

As soon as he is above the snow-line, Mr. Smythe's vision grows clearer; the higher he ascends, the wider becomes his mental horizon. A consciousness of other and greater forces than the merely physical inspires the author, whereby, despite imperfections of form or style, his book reveals what he has found among the hills, " a power of drawing out the best that is within us, a full measure of a perfect happiness." H. E. G. T.

SNOW BABY. By MARIE ANNIGHITO PEARY. *London: George Routledge and Sons* 1935. $7\frac{1}{2} \times 5$ *inches;* viii+318 *pages; illustrations and sketch-map.* 6*s*

Robert Peary's daughter was born in Greenland and was fifteen years old when her father reached the North Pole. She spent a great deal of her childhood in the Arctic racing about on sledges, playing with the Eskimo children, and sailing in Arctic waters on her father's ships. The story therefore is an account of that side of Arctic life which is very pleasing to children, and children will certainly enjoy reading about it. But she gives besides a sidelight on the character of her father, whose mind was not entirely concerned with the grim business of reaching the North Pole. J. M. S.

THE MONTHLY RECORD

BIBLIOGRAPHIE GÉOGRAPHIQUE INTERNATIONALE

The volume of the 'Bibliographie Géographique Internationale' for 1934 (XLIV[e] Bibl. annuelle) was published in January, and copies are now ready for distribution by the Society to subscribers in the British Isles and Dominions. An extended note upon the scope of the 'Bibliographie' and the conditions under which it is distributed by the Society was published in the *Journal* for January 1935 (vol. 85, p. 109). As stated there, in fixing a price for each annual volume, the Society has aimed at making no profit out of the transaction. It was possible last year to distribute the volumes at a price below the cost to the Society, but this year, as there is a small debit balance and the cost has increased slightly, it has been necessary to fix the price for the current volume at 15*s*. This still represents a considerable reduction upon the price at which the volume is obtainable through the ordinary channels. Orders should be sent to the Office of the Society as soon as possible. The volumes for 1924–29 may be obtained at 8*s* 6*d*, for 1930 at 12*s*·6*d*, and for 1931–33 at 13*s* 6*d*, while the stock lasts.

JOURNEY IN BHUTAN AND TIBET

We were glad to receive from Mr. Kingdon Ward the following preliminary account of the important journey from which he is now returning.

"At the end of April I started from the Assam plain, travelling more or less north into the Himalaya east of Bhutan, and crossing the snow range of the Assam Himalaya by the Tulung La and Pen La in June. Thence I reached the headwaters of the Subansiri, and turned east. So far I was on known ground (Neville, or Bailey and Morshead), except for a new route from the Se La to Mago, five days' march. From the Subansiri (or Loro Chu) I turned north again, and crossing two moderately high ranges which fold the country between the Assam Himalaya and the Tsangpo valley, reached Tsari. I then followed an unknown route for eight days, crossing two more passes, finally reaching the Tsangpo at Leling. Thence I followed the river to Tsela Dzong, and crossing the Temo La, reached Tumbatse and Tongkyuk—all comparatively known. At Tongkyuk my most serious exploration began; I was trying to locate definitely the great snowy range seen to the north by Cawdor and myself in 1924. So I travelled north from Tongkyuk, and crossing a difficult unknown pass—the Sobhé La *over* the said snow range—reached the Yigrong River. Here the fun began. I decided that my best plan was to follow the river to its source, as the greater part of the snowy range obviously lay just to the south of it; it appears to have cut its course diagonally across the range—anyhow there are snow peaks and glaciers on both sides. I followed the river westwards for seventeen days' marching, through a gorge comparable with that of the Tsangpo itself, and finally reached its source in the biggest glaciers I have seen north of the Himalaya. Though hidden in the mist most of the time, I believe the principal peaks to be of the order of 25,000 feet. I crossed the range again at the very source of the Yigrong, crossed another pass, and found myself on the Lhasa–China road at Laru, one march east of Gyamda, which I reached towards the end of August. Continuing westwards towards Lhasa, I turned due south to explore a route to the Tsangpo, crossing only one snow range, by the Ashangkang La. I reached the river in eight marches from Gyamda. Continuing almost due south over the two southern fold ranges, *via* Sanga Choling and the Mo La, I reached my base at Chayul Dzong on the Loro Chu ninety days after leaving it. I then started

back for India following the same route over the Pen La, crossed in the first week of October. It was extremely cold for so early in the year—16 degrees below freezing-point inside my double-fly tent on the Pen La—and we all suffered a bit from the wind and temperature, having no winter equipment. (That sounds like very bad management, but I had not expected to go into Tibet at all, let alone so far, and I was not equipped for such a journey. But when the unexpected chance came of course I seized it, equipment or none.)

"Arrived at Mago I changed my route, crossed the Tze La, and reached unadministered British territory again. Finally on October 29 I reached our outpost on the plains, having taken only six months to do the whole trip. I think the geographical results will prove very interesting, and I have a much better idea of how the mountain ranges of south-east Tibet run now. I made a collection of rock specimens from the principal ranges, which will throw a good deal of light on the matter. But of course I went chiefly as a botanist, and the botanical results surpassed all expectations. I think they will give a good idea not only of the flora of Tibet as a whole, but of its origin, and of the place it occupies in the geographical botany of south-east Asia. Anyhow I am very pleased about it.

"I crossed fifteen Tibetan passes not previously crossed by a white man, or even by a pandit of the Survey of India; all between 15,000 and 17,000 feet I think. Some of these were indicated by Morshead, to whose map of southern Tibet I cannot pay too high a tribute. I had a copy of the first compilation (scale $\frac{1}{8}$ inch) and without it I should simply have been lost, as indeed I was when I got off it north of lat. 30° in long. 94°–95° (Gorge of the Yigrong).

"I hope to write a full account of the journey and its principal results before long. I covered roughly 1200 miles in southern and south-eastern Tibet, of which some 500 miles were new. But the great snow range north of the Tsangpo, of the existence of which there is now no shadow of doubt, whatever the heights of the peaks may be, is my chief contribution to geography. The east and west extension of the range I don't know, but it certainly extends eastwards into Pome, and in fact, being so far as I know nameless, might for the present be called the Pome Range. It can hardly appear suddenly between the meridians of 93° and 96°, but I probably struck it in the region of greatest elevation. However until I have studied all available maps, and correlated this year's work with that of 1924, it will be best to say nothing more at present. I am very glad to have definitely located the range, with a degree of accuracy in keeping with our knowledge of this part of Tibet as a whole—say on the 1/M map—after the lapse of eleven years. But I have neither the heights nor the positions of any of its peaks or passes."

ROBERT ADAMS' MAP

Mr. Edward Lynam of the British Museum has sent the following interesting communication to the Society.

"Robert Adams' historic map, showing the forts, batteries, and booms placed along the Thames between Gravesend and Westminster in 1588, to repulse any attack by the Spanish Armada, was for long only known through the reproduction of it published by John Pine in 1740. The original drawing however has recently come to light, and has been shown at several public exhibitions. Through the kindness of the Rawlence family, who have had it in their possession for many generations, I have been allowed to examine it.

It is a charming little map on vellum, typical in its delicate colours and artistic writing of the best Elizabethan work. Signed "Rober: Adamo authore 1588," it bears no title, but is endorsed in a different hand "Thamesis Descriptio(n)." It shows the position and precise field of fire of some fifty-five cannon posted

on either bank of the river. Some most interesting features prove to be absent from Pine's reproduction. One is "the pricked line" showing the Queen's "progresse to the campe," apparently on the visit she made to Tilbury on 8 August 1588, after the Armada had been dispersed. Her route is shown from Greenwich Palace through Deptford to Lambeth, where she crossed the river to Westminster. Thence she proceeded by barge all the way down to Tilbury, where she landed and continued, presumably by carriage, along the "Causey from the forte to y^e^ campe besett w^th^ twenty and seven ensignes to guard her Ma:^ties^ person." Robert Dudley Earl of Leicester, the General in command, received her. It seems most probable that Adams was ordered to make the map specially for the Queen, and may have drawn it during her visit. The reproduction of 1740 also omits the positions in the camp of the "Lo: Generalls Pavilion," "Chaudwell" and "the place of assemblie at armes," which on the original are marked by letters and named in the margin. Joseph Ames the antiquary rather than Pine is to be blamed for these omissions, for Pine states on the reproduction that it was "engraved from a copy drawn by Mr. Joseph Ames . . . 1738 from the Original in parchment." Nevertheless they reduce very greatly the value and interest of the reproduction, and make a new reproduction from the original very desirable. Of the extant maps and documents describing the preparations made by English coast towns against a possible attack by the Armada this is one of the most useful to the military historian.

From Adams' epitaph in Greenwich church we know that he held the post of "Supervisor of the Royal Works," and that he died in 1595. All his known works however indicate that he was considered an authority upon military matters. All of them, curiously enough, are dated 1588. Two were called forth by the Spanish Armada—the present map, and a set of eleven drawings portraying the successive engagements of the English and Spanish fleets off the coast of England, which he seems to have made at the request of the Admiral, Lord Howard of Effingham. These have become famous through the admirable engravings made from them by Augustine Ryther and published by him in 1590 to accompany and illustrate a translation of Ubaldini's 'Expeditionis Hispanorum in Angliam vera Descriptio.' Ryther did these for Lord Howard of Effingham, and he in turn commissioned Cornelis Vroom, a Dutch marine painter, to make designs from them for ten pieces of tapestry. The tapestries were woven by another Dutchman, Francis Spiring, and became one of the finest and most historic adornments of the House of Lords. A third work by Adams is a handsome MS. plan of Flushing, now in the British Museum, which is dated 1588 and shows the fortifications and the posts garrisoned by English troops. The ships in this plan are drawn in great detail and with delicate art. If those in Adams' drawings of the Armada battles were equally good, Ryther must have found it easy to copy them on copper, and must cede to Adams some of the high praise hitherto bestowed upon his ships. According to Walpole ('Anecdotes,' I, 161), Adams was also the author of "a large print of Middleburgh dated 1588." As this is not known and Walpole's statements about Adams are often incorrect, Middelburg may here be a mistake for Flushing; but I have seen no engraving of the plan of Flushing. Adams must have been very active in a military as well as an artistic sense during the year 1588.

But for John Pine, engraver, publisher and Bluemantle Pursuivant, both the drawings of Adams and the story of the Spanish Armada would now be less well known than they are. At the same time as he engraved the "Thamesis Descriptio" from Ames' copy, he had Ryther's spirited engravings and the designs of Spiring's tapestries carefully copied by expert artists (H. Gravelot and P. Lempriere), and from their drawings re-engraved both sets and published

them, with text compiled by Philip Morant from Ubaldini's 'Vera Descriptio' and other sources, in a monumental volume in 1739. He should have known better than to attribute the "Vera Descriptio" to Adams on his reproduction of the "Thamesis Descriptio." Nevertheless and although his style of engraving was characteristic of the eighteenth century and therefore less suitable to his subject than Ryther's more virile manner, his plates have saved for us the magnificent designs of the tapestries in the House of Lords, which were destroyed by fire in 1834. There are copies of Ryther's plates at the British Museum and the Royal Geographical Society, and they were reproduced for the Roxburghe Club by Henry Yates Thompson in 1919; but, as far as I know, Adams' original drawings are lost. The careful preservation of his "Thamesis Descriptio" by the Rawlences is all the more gratifying. According to their family tradition, they inherited it from a Lady Brooke; so that it is possible that Queen Elizabeth gave it to Philip Sidney's friend, young Fulke Greville, afterwards Baron Brooke, who was in the camp at Tilbury when she visited it.

Since the above was written, Major M. Rawlence and his co-heirs have generously presented the map to the British Museum."

SPANISH EXPEDITION TO IFNI

A preliminary account of the first scientific expedition to the Spanish West African territory of Ifni is given by Sr. E. Hernandez-Pacheco in the *Boletin* of the Madrid Geographical Society, September 1935. The Ifni natural region, somewhat larger than the political unit, is comprised of a mountainous massif trending from north to south, that is transverse to the line of the Anti-Atlas. The interior mountainous zone of granitic and volcanic rocks rises in places to 1200–1250 metres: the other orographic zones being the peneplains or "Altiplanicies centrales" (250–350 m.), a hilly litoral zone (200–400 m.), and the extremely flat coastal plain (60–80 m.) along which interesting fossil beds of recent marine remains are to be found. The territory therefore may be likened to an island almost surrounded by the western Sahara, and in fact resembles in many respects the Canary Islands. The climate is maritime and equable; though there is rain on few days, the atmosphere is extremely humid, and this has given rise to a spontaneous vegetation, characterized by cactiform euphorbias, especially on the coastal plain. Elsewhere the predominant plant is the evergreen argan shrub (*Argania sideroxilon*), the sole old-world representative of the American family of the Sapotáceas. This forms the main support of the herds of goats, camels and sheep which are the main support of the native population, numbering about twenty-five thousand. The rumours current about great mineral wealth in the interior proved to be baseless. There is some iron manganese, but the phosphate deposits are of no value. The author makes recommendations for the siting of landing-grounds and the improvement of facilities for shipping. The exposed shallow coast is a special handicap to development: it appears however that something is to be done to improve the roadstead at Sidi Ifni. There is also room for improvement in the provision and maintenance of the rain-water tanks, which apart from a number of springs, maintain the water supply, and also of the primitive irrigation system upon which the inhabitants depend for their few crops. It is possible that Ifni may attain some importance as a section of the African air-route system: at present its interest is for the zoologist and botanist. The paper is accompanied by a number of interesting photographs: topographical surveys, especially along the coast, were executed, but the results have yet to be published.

NOTES ON THE GEOLOGY OF THE WESTERN PACIFIC

In the *Comptes rendus des séances de l'Académie des Sciences*, vol. 200, and the *Comptes rendus des séances de la Société géologique de France*, No. 4, Dr. E. Aubert de la Rüe has added considerably to our knowledge of the geology of the New Hebrides. He has discovered the crystalline basis upon which the previously described rocks rest. This basis consists of many different rocks, including granite. The older volcanic series of rocks, which form the large mountains of Espiritu Santo, are pre-Miocene. De la Rüe considers that the oldest sedimentary rocks, which were previously regarded as Miocene, are much older, and may even belong to the Secondary. Several large islands, Omba (Aoba) and Ambrym among them, are formed of a recent volcanic series, to be distinguished from the old series which is so important in Malekula and Espiritu Santo.

Walpole Island, to the south of the New Hebrides, is a recent structure of coral rock, containing surface pockets of calcium phosphate.

De la Rüe has also studied Wallis Island and Futuna (Fotuna) Island, which lie to the west of Samoa. Their geology has not previously been described. Wallis Island, a mass of basalt with several well-preserved craters, is probably Pleistocene. Futuna is much older, and possesses sedimentary deposits. De la Rüe considers its volcanic rocks to be pre-Miocene.

THE SALE OF A LAFRERI ATLAS

We are pleased to record that the 'Lafreri' sold at Sotheby's in December (*Journal*, January, p. 92) will remain in this country, having been bought for the National Maritime Museum at Greenwich at the high price of £700. The recently adopted designation of that Museum emphasizes its character as a national institution, and the Atlas will thus be always accessible to English students. In regard to the watermarks to be seen on the maps and their margins, a further examination, supplemented by notes kindly sent by Mr. R. J. Tooley, has shown that all but one of the marks on the margins occur also on the maps themselves—a strong point in support of the original character of the collection. Though somewhat fewer, the marks on the maps are generally similar to those in the Wyld volume figured in the *Journal* for April 1929 (pp. 361, 365), the most common of these being the Eagle (No. 20, p. 365), also found in many of the margins. Equally well represented is the mark of a peacock in a circle, an unusual form not figured by Briquet, and hitherto seen in one copy only of the atlas so far examined—that from Milton Abbas now in the Birmingham Public Library.

OBITUARY

SIR ALFRED SHARPE

Sir Alfred Sharpe, who died on 10 December 1935, played a leading part in the establishment of British rule in Nyasaland. After a period in Fiji, where he served as acting stipendiary magistrate between 1885 and 1886, he went out the following year to East Africa as an elephant hunter in connection with the African Lakes Corporation, but was soon actively engaged in the defence of the recently founded Nyasaland Protectorate, serving with Consul O'Neill, Lugard, and Johnston. It was largely owing to his work that a large area west of Lake Nyasa, now forming part of Northern Rhodesia, was brought under the administration of the Chartered Company, and he also contributed largely to the extinction of the slave trade in that part of Central Africa. Sharpe rapidly advanced in the service until in 1897 he succeeded Sir Harry Johnston as Commissioner of British Central Africa—a title which in 1907 was changed to that of Governor of the Nyasaland Protectorate—and held this post until his retirement in 1910.

He had joined the Society in 1891, and contributed accounts of his travels and of the progress of British Central Africa to the *Journal*. For this work he received the Cuthbert Peek award in 1898. His activities and interest in all African affairs by no means ceased upon his retirement. His travels and adventures in Africa between 1912 and 1914 are well described in his book 'The Backbone of Africa.' In 1919 again he visited the interior of Liberia to examine its economic possibilities. His connections with Nyasaland remained close. It is recorded that at the age of seventy he made on foot the long trek from Lake Nyasa to the coast at Lindi, and at the time of his death, at the age of eighty-two, he was preparing for another visit to the Protectorate.

Sir Alfred served on the Council of the Society from 1913 to 1917.

COLONEL P. M. KOZLOV

Colonel P. M. Kozlov,who died in September last, was noted for his extensive travels, over more than forty years, in Mongolia and Tibet. For this work he received in 1911 the Founder's Medal of the Society.

Kozlov, who was born in 1863 at Dukhovshchina, Smolensk, came early in life into contact with Prjevalski, whom he accompanied on the Tibetan expedition of 1883–85. On his return, he equipped himself for serious exploration by studying survey, botany, and other sciences, and for the next thirteen years gained experience in the field with Prjevalski and Roborovski, until in 1899 he was placed in command of an independent expedition. After exploring the Eastern Altai and the Gobi, he established a base in Tsaidam, from which he travelled southwards across the interesting and little-known area in which the Hwang-ho, the Yangtze, and the Mekong have their sources. Kozlov failed to reach Chamdo owing to the hostility of the Tibetans, with whom he came into conflict, and was obliged to abandon his plans for the further exploration of Tibet. He had however carried out important surveys, and made valuable natural history collections. During the course of his second expedition, 1907–09, he came upon the ruined tenth-century city of Kara Koto in the lower basin of the Etsin-gol, from which he excavated many archaeological objects, including books; subsequently he made extensive journeys in Ala Shan, the Hwang-ho valley east of the Koko Nor, and Kansu. In 1924–26 Kozlov

again visited Kara Koto, and pursued his archaeological researches into Northern Mongolia, bringing to light traces of Hellenic culture in this remote region. Kozlov published extensive reports of his travels, which have from time to time been summarized in the *Journal*. His collections greatly enriched the museum of the Russian Academy of Science.

Much of the information concerning Col. Kozlov has been kindly supplied to the Society by Professor Shokalski.

H. E. JAYME BATALHA REIS

H. E. Jayme Batalha Reis, who died at his home, Quinta da Viscondessa, Torres Vedras, Portugal, on 24 January 1935, was born in Lisbon in 1847. Having graduated in Science (1867) he became in 1872 Head of the Agricultural Department of the General Agricultural Institute of Lisbon, where he was Professor of Botany, Nosology and Microscopy of Plants. In 1876 he was Royal Commissioner for Portugal, in charge of Agricultural and Colonial sections, at the United States Centennial Exhibition at Philadelphia. In 1884 he represented the Portuguese Universities at the Tercentenary Celebrations of the Edinburgh University. About 1890 he became Fellow of the Royal Geographical Society, the Royal Scottish Geographical Society, and the Tyneside Geographical Society. He dedicated himself to the study of historical geography in which Portuguese navigators, missionaries, and explorers had played an outstanding part. His interest in geographical matters was not however confined to this. While Portuguese Consul in Newcastle-upon-Tyne, he was charged with various diplomatic missions in London, Berlin, Paris, Madrid, and Brussels, where he was delegate at the Anti-Slavery Congress, 1889–1892. For this reason he was obliged to relinquish his nomination as delegate at the Labour Congress of Berlin organized by Emperor William II. From 1897 to 1911 he was Consul-General in London and Commercial Attaché to the Portuguese Legation. In 1900 he was Portuguese Plenipotentiary at the International Congress for the Protection of African Fauna held in London. He was sent by his Government to the "1er Congrès d'Agronomie Coloniale" in 1905, when he became Vice-President of the Association Scientifique Internationale d'Agronomie Coloniale, of which he remained life member. With Professor Heim he was "Rapporteur Général" of the "Enquête sur la Main-d'Oeuvre Coloniale." It had been on his proposal that this Association had chosen the Labour question in the Colonies as subject for particular investigation and study. In 1911 he was appointed Envoy Extraordinary and Minister Plenipotentiary at the Hague and in 1912 at St. Petersburg, where in 1913 he represented his country at the Tercentenary Celebrations of the reign of the Romanov dynasty. He remained at St. Petersburg during the years of war and revolution until April 1918, when he left Russia by the Murmansk. At the end of 1918 he was nominated Delegate Plenipotentiary for Portugal at the Peace Conference and was Portuguese representative at the Commission which made the Draft of the Covenant of the League of Nations. After organizing the Secretariat of the League of Nations at the Lisbon Foreign Office he retired in 1921, having completed fifty years of public service.

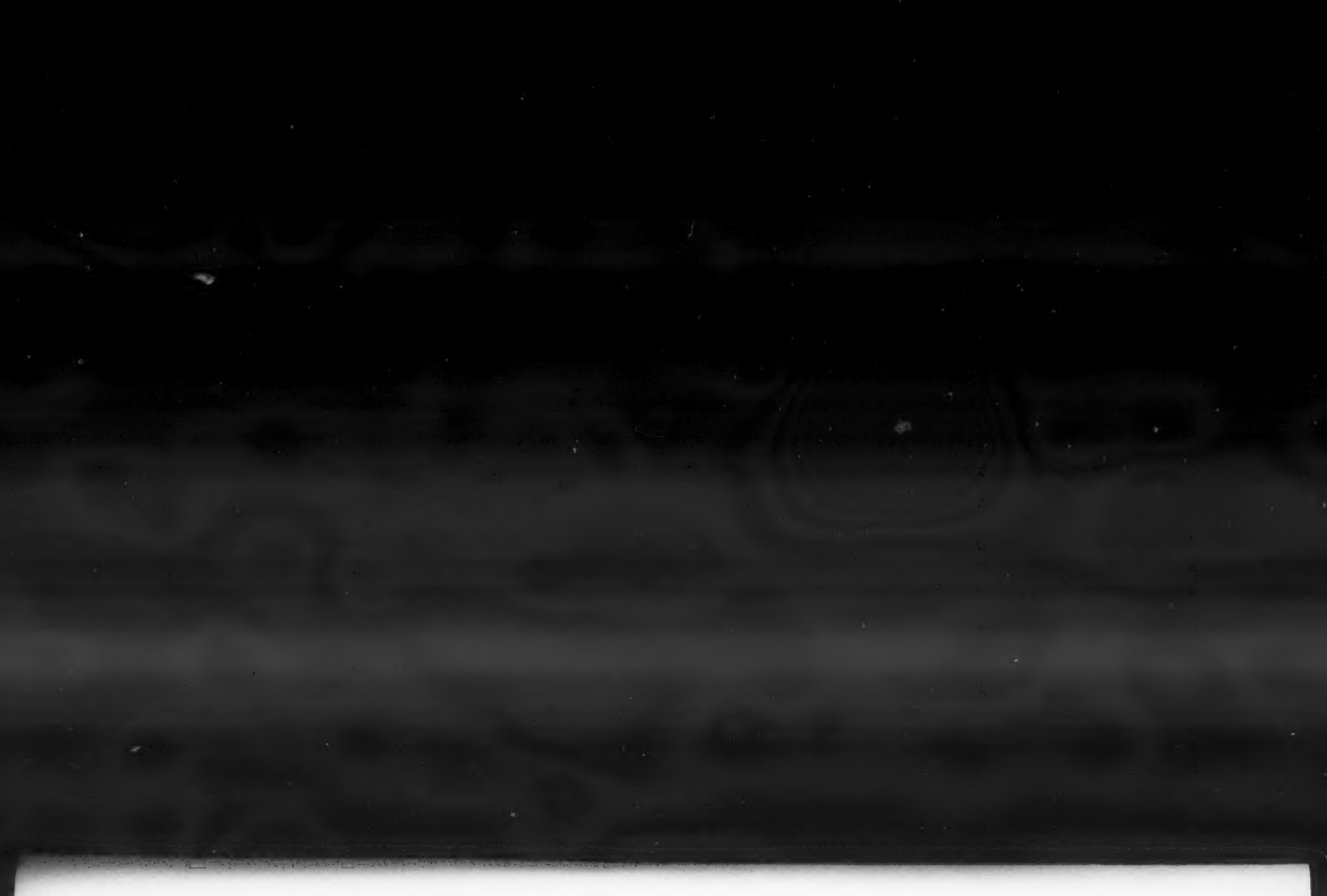
MEETINGS: SESSION 1935–36

Sixth Evening Meeting, 6 January 1936. The President in the Chair

Elections: Syed Majid Alam, B.A.; Alexander Menzies Anderson; Miss Anna MacLeod Bethune, M.A.; Eric Francis Boult, A.M.I.A.E.; Mrs. Marian J. Clegg; Edward Davison; Mrs. Alma Ellwood; Mrs. Margaret Olive Fuller; Stanley L. Hockey, M.A.; Miss Isobel Wylie Hutchison; Michael James Leahy; Sir Harry Lindsay, K.C.I.E., C.B.E.; Sir Richard R. Maconachie, K.B.E., C.I.E.; Henry Herbert Mardon, B.SC.; Richard Maurice; The Hon. Mrs. Denis Maxwell; Miss E. A. Mary Maxwell; Felix Mary Samuel Moorat; John Nix; Francis William Rhodes; J. Dixon-Scott; Frank Thomas Smith, B.SC.; Miss Dorothy Sylvester, M.A.; Miss Ida G. Thompson; Rufus Bernhard von Kleinsmid, LL.D., D.SC.; Captain B. Wallich

Paper: An Expedition in the Southern Libyan Desert. By Mr. W. B. Kennedy Shaw

Seventh Evening Meeting, 20 January 1936. The President in the Chair

Elections: Miss Anne Katherine Allinson; The Rev. William Arthur Henville Barnes; The Rev. William Henry Barnes; Reginald George Booth; Mrs. Evelyn Kate Browne; The Rev. Henry Frederick Burroughs; Miss Muriel Douglas; William Dreghorn; Miss Deborah Emma Elliott; Walter Henderson-Cleland, M.C.; David Arthur Gilbert Hinks; Frederick W. N. Hornsby; Mrs. Mary James; Dr. Donald McIntosh Johnson; C. Scott Lindsay; The Rev. Walter Forrest McWhan; Morris Marples, M.A.; John Grey Murray; Albert Edward Oakley; Miss Ann Old; Thomas Hugh Pollock; Jocelyn Panizzi Preston, F.R.A.I.; Eric Douglas Robinson; The Marchioness of Sligo; Thomas Vernon Snowden; Lieut. William Russell Smijth-Windham, R.C.S.

Paper: The British Somaliland–Ethiopian Boundary. By Major E. H. M. Clifford.